November 3, 1947

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

EDITORIAL INDEX, PAGE 53

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DETROIT

PORTER
DIESEL ELECTRIC
LOCOMOTIVES
For Economical Haulage

PORTER-BUILT means "BETTER BUILT"

H. K. PORTER COMPANY, Inc.
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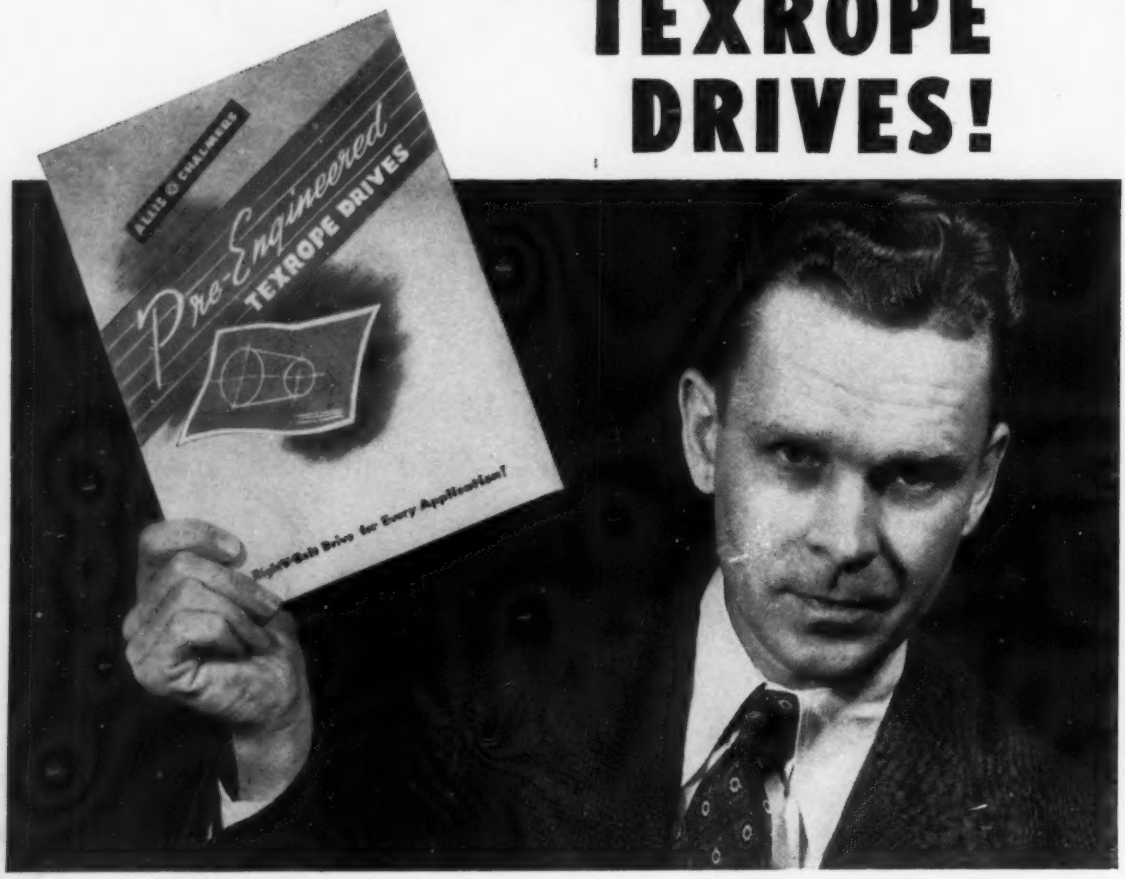
√R v. 121 3 Nov.-Dec. 1947

NEW MANUAL PRESENTS

Pre-Engineered TEXROPE DRIVES!



Selects Most Economical Drive for Any Installation!

NEVER BEFORE has specification of the *right* V-belt drive been made so simple, so unerring. You turn to a page, run down a column, and there, in *one place* is the drive you need . . . number of grooves, diameters of sheaves, size of belt. No turning from table to table, no figuring.

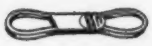
These *Pre-Engineered* stock Texrope drives cover 90% of all requirements. Texrope engineers have carefully selected each one, using economical *stock* belts and sheaves. Each selection is the *one best drive* for a given requirement of power, speed and dimension.

For the few cases not covered by *Pre-Engineered* stock drives, the manual provides complete, carefully arranged engineering data to make it easy to figure special drives.

Now Available . . . 144 pages, indexed, size 8½ by 11 inches. The most complete V-belt drive manual ever published. A book that only Allis-Chalmers can give you. Copies have been sent to many Texrope dealers and users. If you have not received one, write for Texbook No. 20P40. ALLIS-CHALMERS, MILWAUKEE 1, WIS. A 2333

Texrope, Super-7, Texsteel, Texdrive, Magic-Grip and Vari-Pitch are Allis-Chalmers Trademarks

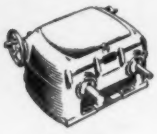
TEXROPE .. Greatest Name in V-Belt Drives



"Super 7" V-BELTS
Five Types — Sizes to suit every power transmission job.

Texsteel, Texdrive, "Magic-Grip"
— sheaves in a full range of sizes, grooves.

"Vari-Pitch" SHEAVES
Exact variations in speed, stationery or motion control.



SPEED CHANGERS
Speed variations up to 375% at the turn of a crank.

ENGINEERING
Finest V-Belt engineering talent in the world—at your call.

TEXROPE "Super 7" V-Belts result from the cooperative research of two great companies — Allis-Chalmers and B. F. Goodrich. They are sold only by A-C.

ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment — Biggest of All in Range of Industrial Products

1847 1947 A CENTURY OF SERVICE to Industry THAT MADE America Great

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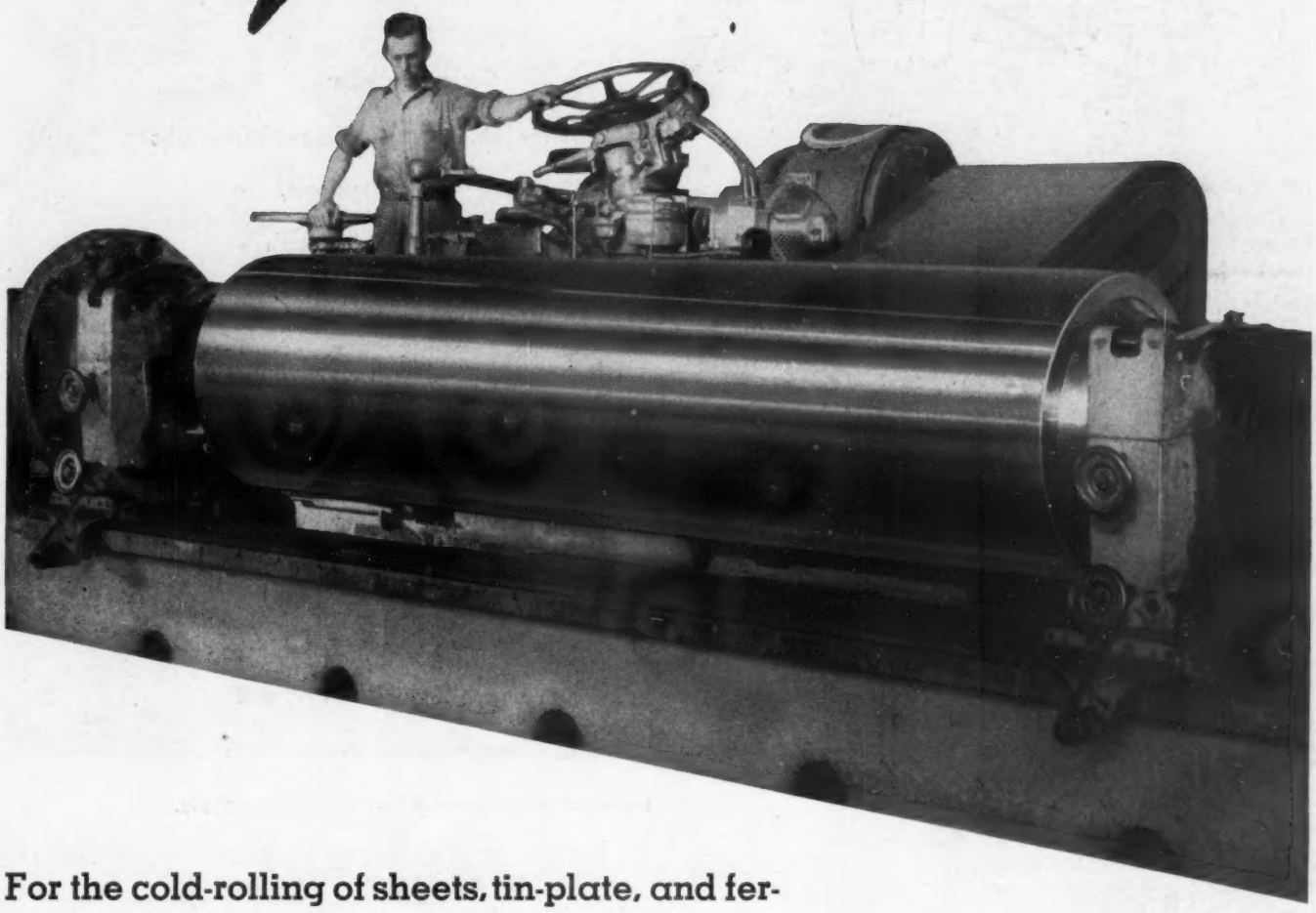
by BETHLEHEM



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Success means

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Rubber "red cap"

A typical example of B.F.Goodrich product development

THEY used to hoist bags and mail to the storage-nose of planes by climbing up ladders—one bag at a time. It slowed up loading, held up planes, meant passengers had to wait at the other end for their luggage to be slowly unloaded, wasn't too easy on your bags and was very hard on the baggageman's legs.

Some airport official had heard of a special B. F. Goodrich conveyor belt carrying sugar bags up a steep incline in a sugar refinery. Surface of the belt consists of 3000 soft rubber knobs or "fingers" per square foot—soft enough to spread and grip a package, and so prevent slipping even when the belt climbs at a steep angle.

The official and a maker of portable conveyors worked out, with B. F. Goodrich engineers, a short length of this "Griptop" belt, as it is called, mounted on a small truck. Now baggage, mail, express are hurried safely into and out of planes in a fraction of the time formerly needed.

Developments like this are being made constantly at B. F. Goodrich. Another is the "Cord" belt—an entirely new method of belt construction, which stands shock loading of coal, stone, ore, and sometimes lasts as much as 10 times longer than other belts. Another is a B. F. Goodrich belt able to carry hot ashes or chemicals without burning as earlier belts did.

No product is ever considered finished at B. F. Goodrich—research to improve it goes on constantly. That's why it pays to keep in frequent touch with your B. F. Goodrich distributor. *The B. F. Goodrich Company, Industrial Products Division, Akron, Ohio.*

B.F.Goodrich

FIRST IN RUBBER

Behind the Scenes...

Where To Steal Steel

Seems that we were way off base last week in intimating that our editorial department wouldn't run any articles on how to get steel. Just indignant, the boys up on topside point out that in the very same issue they had an article listing all the new mills, where they are located, when they will start rolling and what products they turn out. We saw that just as soon as the book was out and hereby tender our apologies to the brains dept. To make amends, we'll offer to send tear sheets of that page with the table of new rolling mills on it to any reader who wants it—just as long as our stock lasts. We also found out that the boys have been busily preparing some additional articles on the steel delivery situation which may shed some light on the future possibilities of delivery. Although they still aren't going to print the names of places where you can buy steel today, mostly because there just aren't any such places on most products, they are preparing to tell you what you can expect in the future and why—basing their thoughts on the balance of supply and demand in a lot of different steel products.

Metal Memories

Well, as we told you last week, the Metal Show is over but some of its memories remain. Like the one of you readers who took us up on the offer to come in and share our booth. This boy took us at our word, and brought in several of his cohorts. Settled in a comfortable corner, they held an important sales powwow for about an hour in the middle of a busy day at the show. Probably trying to hatch up some plan for sabotaging a competitor's booth, or maybe figuring out a way to collect all the gadgets that were being given away by the exhibitors. There were lots of those, including pipes, perpetual calendars, aluminum coasters, several different types of key chains, cigarette lighters and others ad nauseum. There was also a lot of interest in the exhibits, including our own where the research department had set up some of its machines which kept punching and sorting cards automatically for days. They had it all fixed up so that cards of one color all wound up in the same place, which led one admirer to admit, "That blamed machine can deal a poker hand better than I can!"

Forward Planning

Although this is only the first issue in November, there is evidence around here to show that Christmas is already a thing of the past and New Year's Eve only a sad memory in the minds of our editors. They're already living only for January 5, upon which date our Yearbook of Industry issue makes its bow. From now until then, they'll be busier than a gang of beavers trying to dam the Mississippi, getting all their plans prepared and the actual issue in print and in the mail. We have heard a few of their plans, and they sound mighty interesting to us. Under threat of being crated into our orange-crate desk and shipped to Zanzibar, we promised not to tell, so we can't—yet. Just wait. We'll soon find an excuse to whisper some advance dope into your ears about the big job they're planning.

Puzzle Corner

Our vice-president and general manager, Mr. George O. Hays, contributes this one for our puzzle corner. Time required, 5 minutes or less. If you can't figure it out by that time, you may feel free to join us at the foot of the class, because we couldn't do it either! Seems that in a faraway state there were two important cities named Polatchka and Perterba. The railroad ran trains between these cities on a continuous schedule, a train leaving Polatchka and heading straight south to Peterba every hour on the hour, and also one leaving Perterba and heading straight north for Polatchka every hour on the hour. The trip took 24 hours each way. Now, gentle readers, the question is this: How many trains would you pass if you took that ride, not counting the one which pulled into the station as you left, nor the one that left just as you completed your journey?

Shrdlu

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STEEL

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Published by THE PENTON PUBLISHING Co., Penton Building, Cleveland 13, Ohio, E. L. SHANER, President and Treasurer; G. O. HAYS, Vice President and General Manager; R. C. JAENKE, Vice President; F. G. STEINEBACH, Vice President and Secretary; E. L. WERNER, Assistant Treasurer. Member, Audit Bureau of Circulations; Associated Business Papers Inc., and National Publishers' Association.

Published every Monday. Subscription in the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $10; two years $15; all other countries, one year $18. Single copies (current issues) 35c. Entered as second class matter at the postoffice at Cleveland, under the Act of March 3, 1879.

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Favorite meeting place for youngsters and oldsters—the gleaming soda fountain. And here Sharon Stainless Steel really shines—for lasting beauty, for resistance to wear, for ease of cleaning.

Add beauty to utility in appliances, cutlery, utensils or decorative trim...with easy-to-fabricate Sharon Stainless Steel. Furnished in coils for long machine runs, or cut lengths, as desired.

SHARON STEEL CORPORATION

Sharon, Pennsylvania

SHARONSTEEL

PRODUCTS OF SHARON STEEL CORPORATION AND SUBSIDIARIES: THE NILES ROLLING MILL COMPANY, NILES, OHIO; DETROIT TUBE AND STEEL COMPANY, DETROIT, MICHIGAN; BRAINARD STEEL DIVISION, WARREN, OHIO; SHARONSTEEL PRODUCTS COMPANY, DETROIT, MICHIGAN, AND FARRELL, PENNSYLVANIA. Hot and Cold Rolled Stainless Strip Steel — Alloy Strip Steel — High Carbon Strip Steel — Galvanite Special Coated Products — Cooperage Hoop — Detroit Seamless Steel Tubing — Seamless Steel Tubing in Alloy and Carbon Grades for Mechanical, Pressure and Aircraft Applications — Electrical Steel Sheets — Hot Rolled Annealed and Deoxidized Sheets — Galvanized Sheets — Enameling Grade Steel — Welded Tubing — Galvanized and Fabricated Steel Strip — Steel Strapping, Tools and Accessories.

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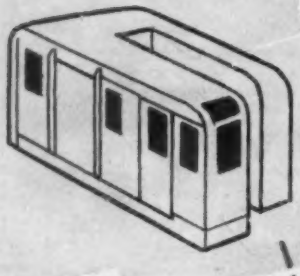
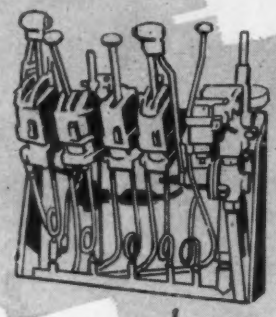
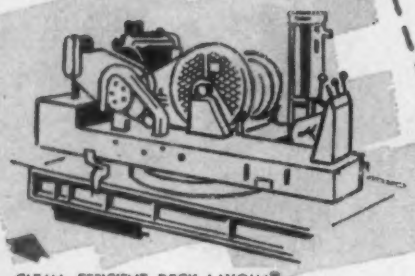


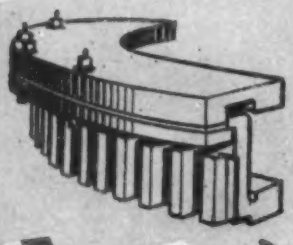
FULL VISION CAB places operator at side of boom, not behind it, gives him full view of load at all times.



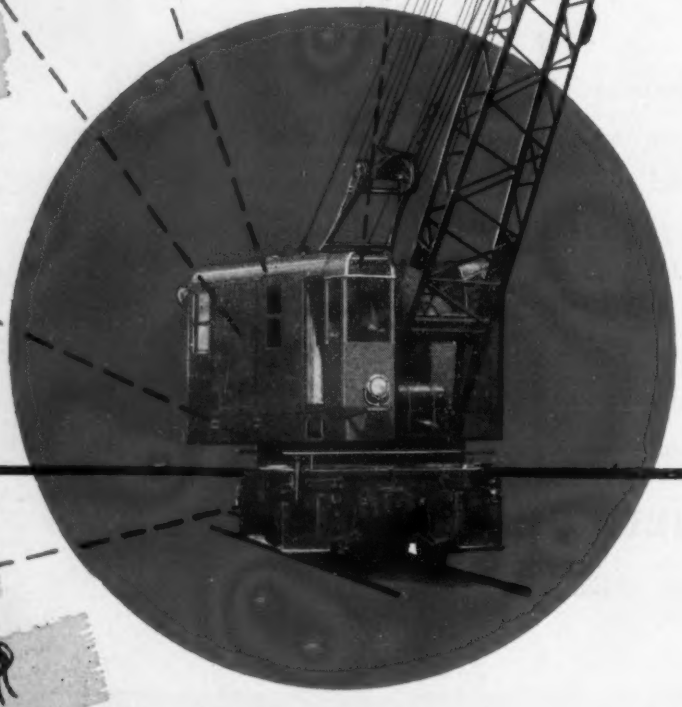
FINGER TIP AIR CONTROLS reduce waste motion and operator-fatigue. Control levers positioned for easy, natural use of hands. Over-excitation of magnet controlled by push-button.



CLEAN, EFFICIENT DECK LAYOUT makes maintenance easy. No pyramiding of deck equipment. All machinery enclosed. Welded, rolled steel full width deck.



ENCLOSED ROLLER BEARING TURNTABLE uses American's exclusive, patented interlocking gib ring. Nine foot diameter turntable has 27 bronze bushed conical steel rollers —live, stable load-carriers.



ELECTRIFIED CARBODY has two powerful electric motors driving truck axles through single reduction spur gears and pinions sealed and running in oil.

Diesel Power to the Deck

Electric Power to the Trucks

. . on the World's Tough est Jobs

THE AMERICAN

DIESELECTRIC

A REVOLUTIONARY NEW LOCOMOTIVE CRANE

Scores of major wearing parts eliminated in the underbody . . . a clean, efficient deck, where maintenance work is a matter of minutes . . . smooth, powerful electric motors driving the wheels!

• • • That's the mechanical story of the AMERICAN DIESELECTRIC. But the economic story—established by years of testing on industry's toughest jobs—is even more important: *this crane will earn back its own cost in five years.*

In mechanical cranes, 50% to 75% of all maintenance work has been in the travel mechanism. By designing this clean, simple electrified drive, American Hoist engineers have actually reduced upkeep expense by as much as 25% to 50%!

The AMERICAN DIESELECTRIC is not a converted crane. It is new in every part, from trucks to boom point . . . specifically created for the best utilization of diesel-electric power. Obviously, this was not an "overnight" job of engineering.

Actually, the development of this crane has required about fifteen years. On-the-job tests have now run two to seven years in railroad and industrial operations. Names of users and detailed cost studies will be furnished upon request.

A new catalog, just off the press, gives full specifications and operating data. Mail the coupon below.

ASK THE MAN IN THE CAB!

● Even the world's finest locomotive crane can be no more efficient than its operator. For that reason, American Hoist engineers have given the DIESELECTRIC the most comfortable, orderly and ingenious cab arrangement ever created. The cab is forward of the main deck mechanism, to right of boom. Operator sits high and close to the boom at the best possible angle for guiding his load. Windows front, side and top permit excellent view even in cold weather operation. The cab is fully partitioned from machinery deck . . . clean, quiet and comfortable at all times. Controls are all air-actuated, and levers respond to finger-tip pressure, assuring maximum work output and minimum fatigue.

DIESEL-ELECTRIC LOCOMOTIVE CRANE, PATENT NO. 2083460. TOUCH CONTROL, PATENT NO. 2370856.

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Please send me your new catalog describing AMERICAN Dieselectric Locomotive Cranes.

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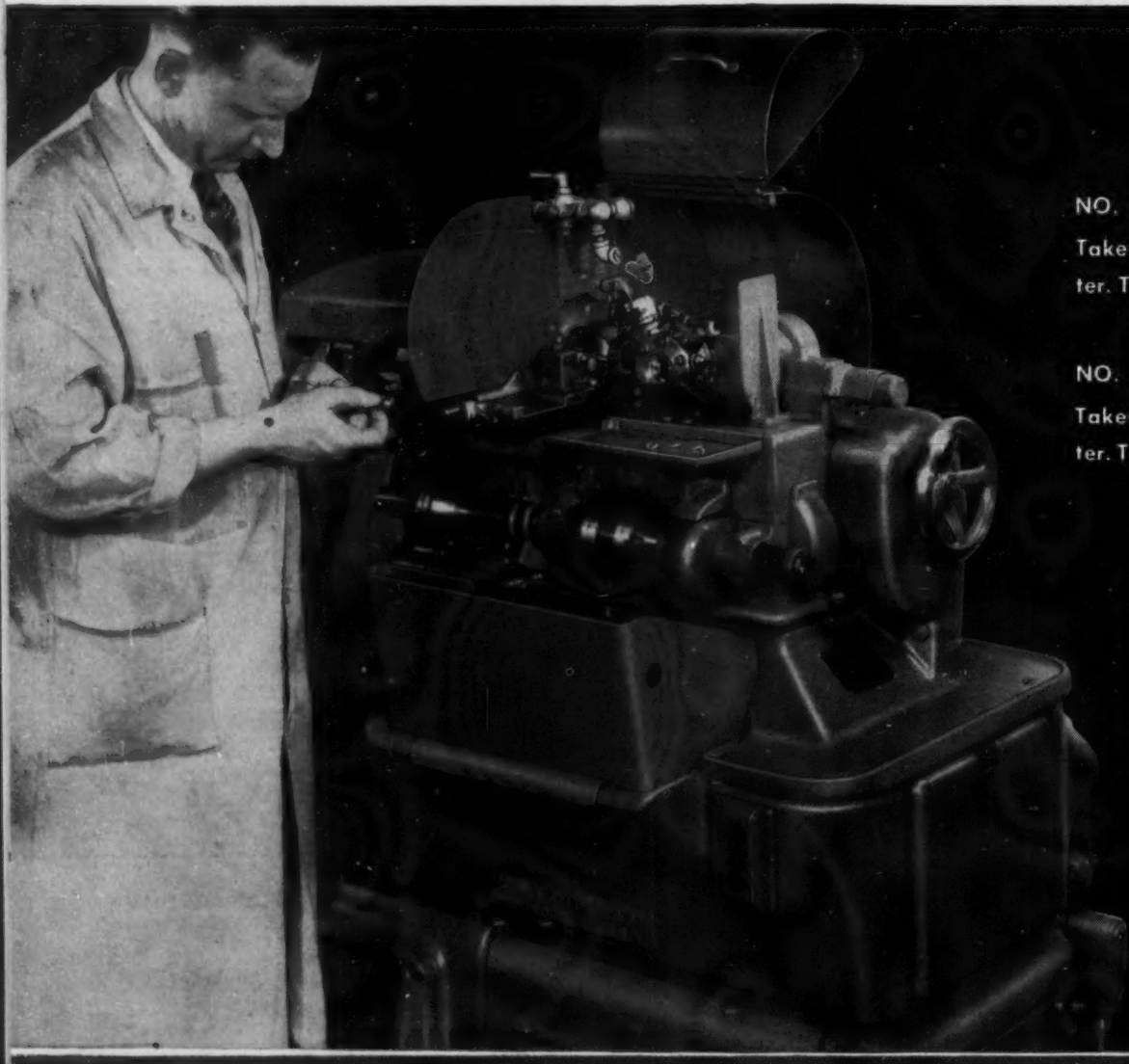
Presenting

THE NEW DESIGN "OOG" AND "OG" AUTOMATIC SCREW MACHINES

IMPROVEMENTS AND REFINEMENTS have been made in these Automatic Screw and Automatic Cutting-Off Machines to increase their efficiency and to permit the maintenance of closer limits, finer finish and more uniform production.

Spindle is positively driven at all speeds and is provided with 196 two-speed combinations including a wide range of high to low speed ratios. This wide selection of ratios makes possible the use of correct speeds for threading without limiting the selection of efficient high speeds for forming, drilling and similar operations. Equal cutting efficiency is obtained on all materials ranging from tough alloy steels to free-cutting plastics and on the widest range of work diameters.

Numerous design and construction details combine to shorten set-up time and a wide assortment of available attachments further increases overall value in terms of investment. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.



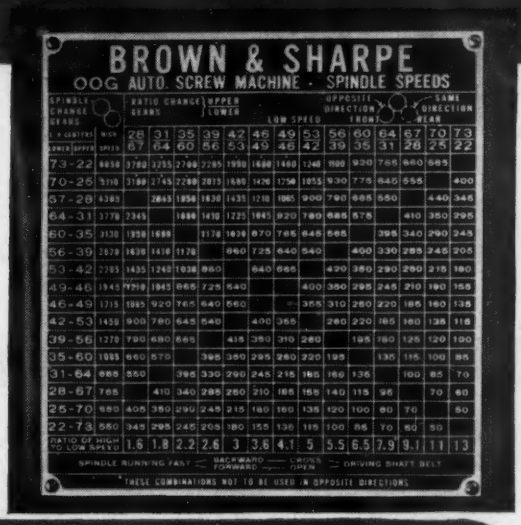
NO. OOG CAPACITY . . .
Takes stock to ⅜" diameter. Turning capacity to ¾".

NO. OG CAPACITY . . . .
Takes stock to ⅝" diameter. Turning capacity to 1¼".

BROWN &

Featuring

196 two-speed combinations of spindle speeds with positive chain drive to spindle



BROWN & SHARPE

OOG AUTO. SCREW MACHINE · SPINDLE SPEEDS

SPINDLE CHANGE GEARS	RATIO CHANGE GEARS			UPPER / LOWER					OPPOSITE DIRECTION LEAD				SAME DIRECTION REAR		
LOW SPEED	28	31	35	39	42	46	49	53	56	60	64	67	70	73
UPPER SPEED	67	64	60	56	53	49	46	42	39	35	31	28	25	22
73-22	6050	5780	5355	5040	4785	4500	4300	4060	3780	3520	3200	2980	2800	2650
70-25	5710	5390	4745	4460	4215	3980	3790	3580	3330	3100	2820	2625	2465	2335
67-28	5365		4265	4010	3790	3580	3410	3220	2995	2790	2535	2360	2220	2100
64-31	5070	4745		3680	3475	3285	3125	2955	2745	2560	2325	2165	2035	1925
60-35	4730	4425	3890		3245	3065	2915	2755	2560	2385	2170	2020	1900	1795
56-39	4420	4135	3635	3440		2865	2725	2575	2395	2230	2030	1890	1775	1680
53-42	4185	3915	3445	3255	3080		2580	2440	2265	2110	1920	1790	1680	1590
49-46	3945	3690	3245	3070	2905	2745		2300	2135	1990	1810	1685	1585	1500
46-49	3715	3475	3055	2890	2735	2585	2455		2010	1870	1705	1585	1490	1410
42-53	3450	3225	2840	2685	2540	2400	2280	2135		1740	1585	1475	1385	1310
39-56	3210	3000	2640	2495	2360	2230	2120	1980	1845		1470	1370	1290	1220
35-60	2885	2695	2370	2240	2120	2005	1905	1780	1655	1540		1230	1155	1095
31-64	2565	2395	2110	1995	1885	1785	1695	1585	1475	1370	1250		1030	975
28-67	2315		1905	1800	1705	1610	1530	1430	1330	1235	1125	1040		880
25-70	2065	1930	1700	1605	1520	1440	1365	1275	1190	1105	1010	935	880	
22-73	1815	1695	1495	1410	1335	1265	1200	1120	1045	970	885	820	770	730
RATIO OF HIGH TO LOW SPEED	1.6	1.8	2.2	2.6	3	3.6	4.1	5	5.5	6.5	7.9	9.1	11	13

SPINDLE RUNNING FAST — BACKWARD — FORWARD — CROSS — OPEN — DRIVING SHAFT BELT

*THESE COMBINATIONS NOT TO BE USED IN OPPOSITE DIRECTIONS

196 TWO-SPEED COMBINATIONS

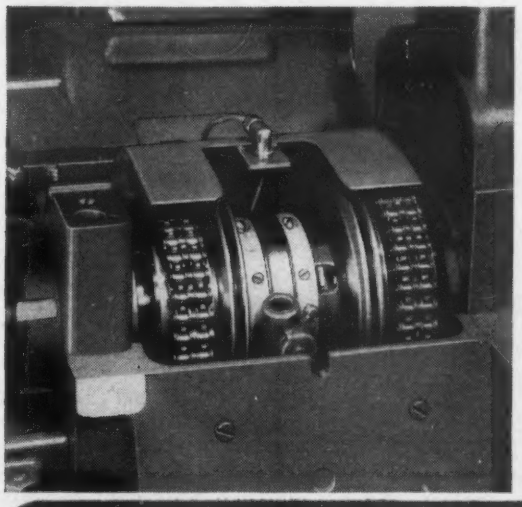
are provided with a range from 6050 to 50 R.P.M. on the "OOG," and a range of 4230 to 35 R.P.M. on the "OG." Approximate ratios of high to low speeds range from 1.6:1 to 13:1 except for highest and lowest high speeds where ratios range from 1.6:1 to 11:1.

HIGH SPEEDS EASILY CHANGED

by one pair of pick-off gears. Gears quickly withdrawn from splined shafts by loosening clamp nuts, releasing washers. Replaced by another set from storage compartment in door. One set of 16 gears provides not only 16 high speeds, but also all ratio changes.

LOW SPEED RATIO AND DIRECTION

equally easy to change. Selecting the direction of low speed is done merely by placing lower of two change gears on proper one of two centers. Driving sprockets and spindle driving chains remain untouched.



CHAIN-DRIVEN FULL-ANTIFRICTION-BEARING SPINDLE

Positive drive of spindle by roller chains at all speeds insures required power throughout full range of operations within capacity of machine. Spindle readily removable. End thrust is taken by preloaded, precision ball bearings.

SHARPE

B·S

Write for Samples...
Yours for the Asking

TEST THE SPEED OF "SPEED CASE"

X1515 LOW CARBON OPEN HEARTH STEEL

ALSO PROVE TO YOURSELF THAT IT WILL DO ALL THESE THINGS...

1 Machine at 250 SFPM.

2 Carburize with better results than with C1019.

3 Reduce distortion at least 75%.

4 Increase tool life 2 to 5 times.

5 Bend or deform without fracture.

6 Replace "duplicating" analyses in your inventory.

SPEED TREAT STEEL
Medium High Carbon for Heat Treating

DO THIS . . . Pick out that "tough one" you have and ask us to show you how to "lick it" with Speed Case.

Tear off here ATTACH TO YOUR LETTERHEAD AND MAIL TO EITHER COMPANY BELOW

The FITZSIMONS STEEL COMPANY
Licensee for Eastern States
YOUNGSTOWN, OHIO

MANUFACTURERS OF A COMPLETE LINE OF COLD FINISHED CARBON AND ALLOY STEEL BARS

Licensor
MONARCH STEEL COMPANY
HAMMOND · INDIANAPOLIS · CHICAGO
PECKOVER'S LTD., Toronto, Canadian Distributor

ACTUAL PHOTOGRAPH
Speed Case Steel (.20 carbon) 1 inch cold drawn bar tied in a knot, cold, without fracture.

CONSIDER THE "Eye-Value" of Tubing IN PRODUCT DESIGN

● Lightness, strength, rigidity, and all the other structural advantages of electric welded tubing are daily becoming better recognized by design engineers. What some are slower to appreciate is the great sales appeal or "eye-value" of tubing.

Typical Example: Furniture manufacturer, using steel tubing mainly for legs of folding tables and chairs. The chair developed side-sway. Two steel rod braces between front and rear legs were replaced with a single tubular brace, curved down at ends and form-fitted over legs. Result: Perfect rigidity, with greatly improved appearance, at no extra cost. This manufacturer has found more and more places for tubing in product design. Significantly, business has increased by leaps and bounds.

Yoder Tube Mills are found wherever electric welded tubing is made. They are universally recognized as the highest development in high-production cold-roll tube forming and welding equipment.

Send for literature containing illustrations and information on equipment for making pipe and tubing.

THE YODER COMPANY
5502 Walworth Ave. • Cleveland 2, Ohio

ENGINEERING YODER TRADE MARK MANUFACTURING

ROLL FORMING, TUBE MILL AND SLITTING MACHINERY

36 YEARS' LEADERSHIP • COILING • SLITTING • FORMING • EMBOSSING • CURVING • WELDING • CUTTING-OFF

SANDVIK COLD-ROLLED STEELS
are specialists in tough applications

SOME SANDVIK SPECIALTY STRIP STEELS

- Band Saw Steels
- Clock and Watch Spring Steels
- Compressor Valve Steel
- Conveyor Belting
- Doctor Blade Steel
- Feeler Gauge Steel
- Knife Steels — Art, Surgical, Textile, etc.
- Magnetic Sound Recording Tape
- Piston Ring Segment and Expander Steels
- Razor Blade Steel
- Reed Steel
- Shim Steel
- Sinker Steel
- Spring Steels
- Textile Steels
- Vibrator Reed Steel
- Wood Band Saw Steel

Do you have an application that calls for steel strip with "out-of-the-ordinary" physical abilities? If you do, Sandvik probably has a steel that will fit your job to a "T".

Made by special processes of an extremely high grade of raw materials, Sandvik *high carbon*, cold rolled steels are known for their uniform hardness, high fatigue life, accurate size and fine surface. To suit individual conditions, the strip can be supplied in a variety of analyses, thicknesses, widths and surface finishes. It may be obtained annealed, unannealed or hardened and tempered, depending on the mechanical properties needed.

For twenty-six years Sandvik cold-rolled steels have been meeting the high physical demands of a wide variety of special purposes. Sandvik will be glad to help you select a steel that will be practically custom fitted to your job.

'Phone or write today for complete free information and stock lists.

SS-18

Sandvik Quality Steels

SANDVIK STEEL, INC.

111 Eighth Ave., N. Y. 11, N. Y., WAtkins 9-7180

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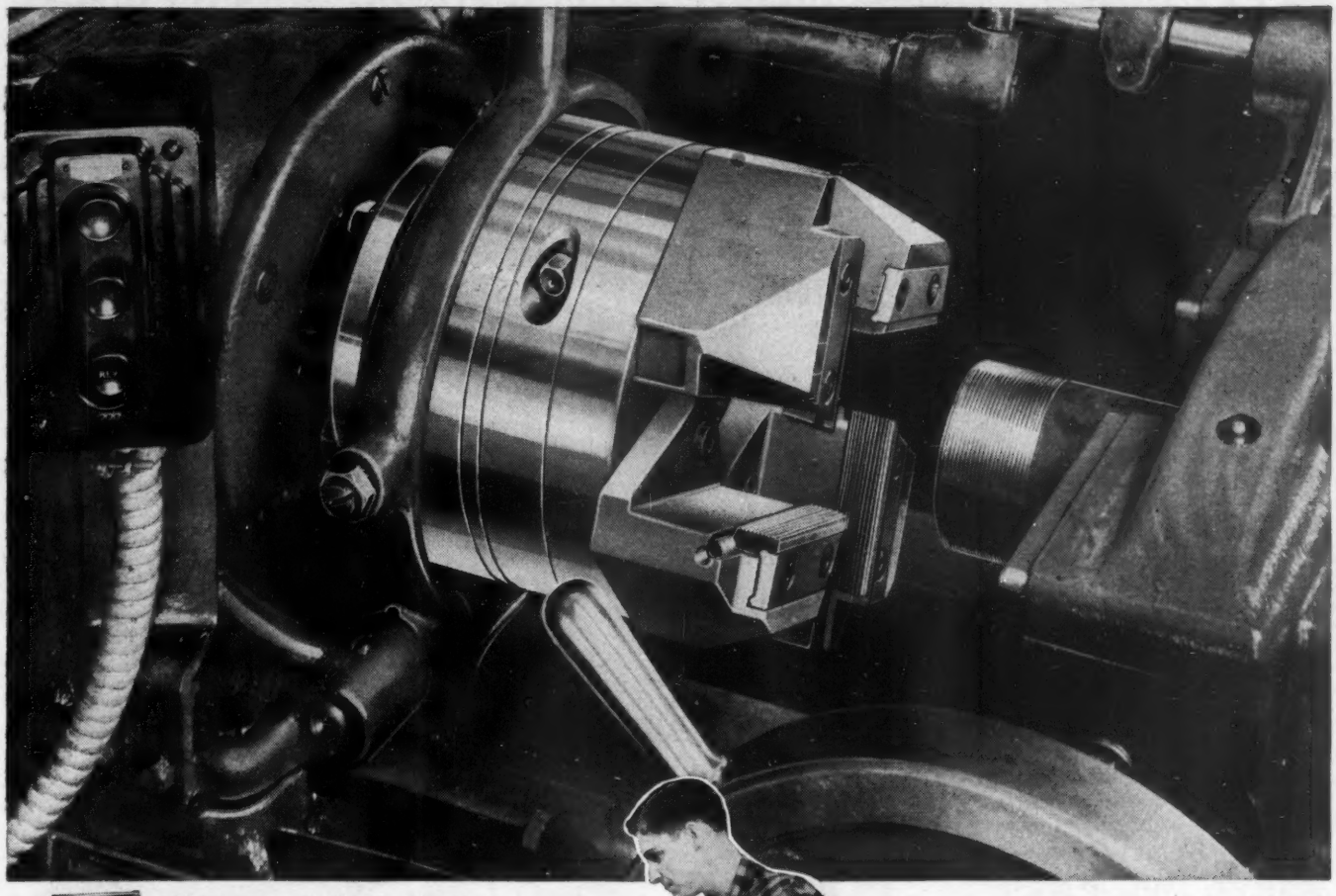
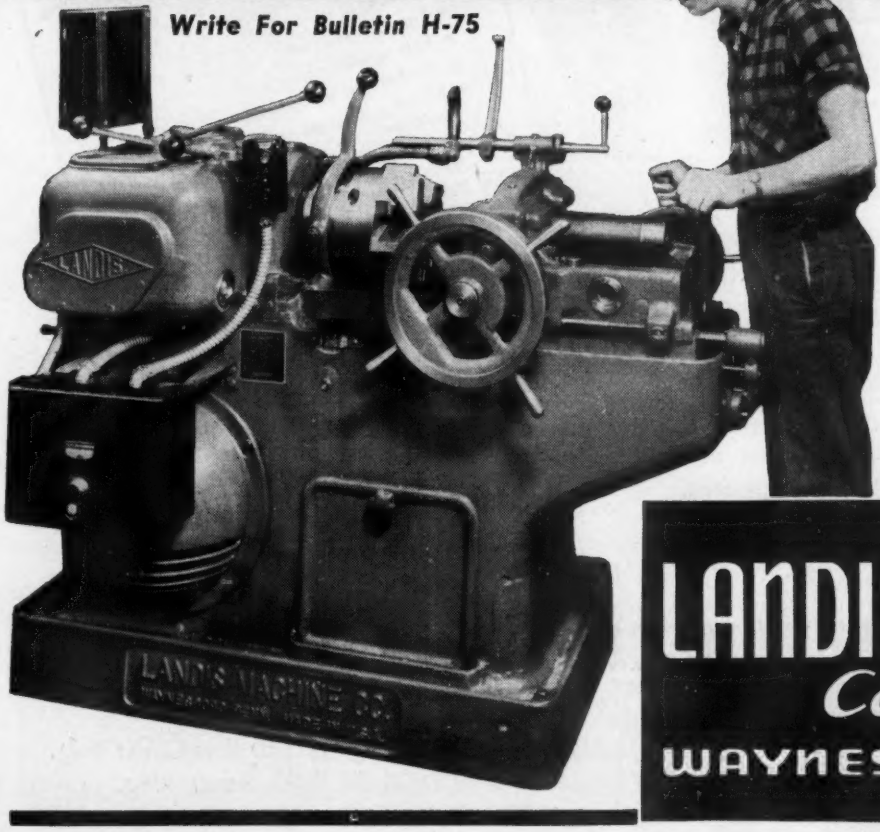
1736 Columbus Rd., Cleveland 13, Ohio, CHerry 2303

WAREHOUSES: New York and Cleveland

LANDMACO THREADING MACHINES

For Speed, Accuracy & Economy on a Wide Variety of Threading Jobs





Write For Bulletin H-75

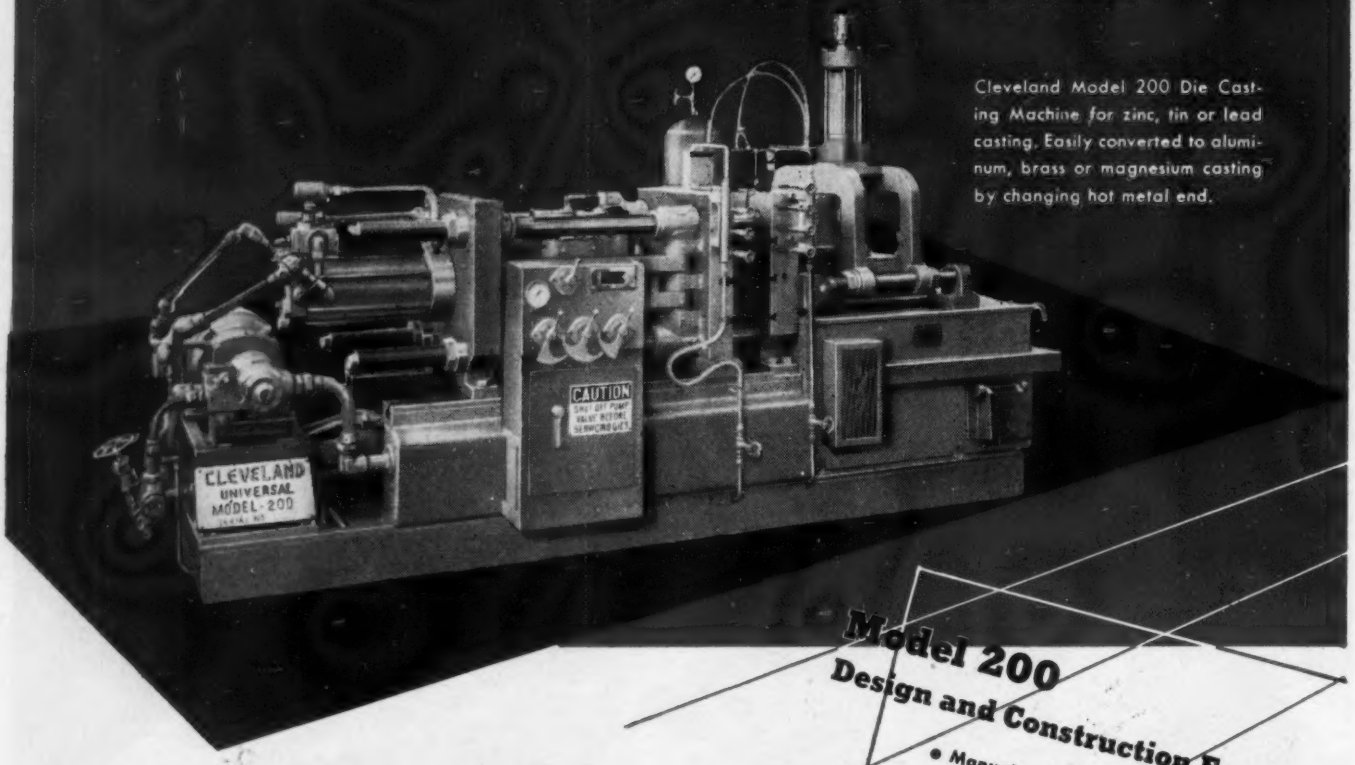
● The 1½" LANDMACO Single Head Leadscrew Threading Machine equipped with the 1½" LANCO Die Head fitted with oversize chaser holders is illustrated producing 3½" diameter 12 pitch threads on pump stators. This machine has a standard capacity of ⅜" to 1½".

An eight speed selective type gear box, leadscrew attachments, and anti-friction bearings are only three of many outstanding features of the LANDMACO. These Threading Machines are built in 1" and 1½" Single-, Double-, and Quadruple-Head models and 2" and 2½" Single- and Double-Head models.

LANDIS MACHINE Company
WAYNESBORO, PA., U.S.A.

Announcing

THE NEW CLEVELAND MODEL 200
Universal High-Pressure Hydraulic
DIE CASTING MACHINE



Cleveland Model 200 Die Casting Machine for zinc, tin or lead casting. Easily converted to aluminum, brass or magnesium casting by changing hot metal end.

RIGID · · · FAST · · · FLEXIBLE!

The new Model 200 Die Casting Machine is the result of intensive Cleveland research to design a machine having platens approximately 27"x27", capable of locking dies with tremendous pressure to produce castings of highest quality at high speed.

The Model 200 incorporates all the superiorities of the widely used Model 400 Cleveland. Construction permits the maximum amount of interchangeability. On both models, platen and die plate T-slots are identical in size and location—goosenecks, nozzles, plungers, sleeves, etc., are interchangeable.

Every requirement for fast, accurate, profitable die casting is met by the new Model 200. Investigate this outstanding Cleveland development. Write today for new bulletin and complete information.

Model 200
Design and Construction Features

- Manual or full automatic control
- Easy accessibility
- Fast injection speed
- Mechanical or hydraulic ejection
- Platen supported by bronze wedges
- Die stroke adjustable by hand crank
- Die movement controlled by safety valve
- Heat exchanger and oil filters
- Hardened toggle pins and bushings
- Seamless steel tubing hydraulic system
- Swivel fittings on die and shot ends
- Nitrided gooseneck sleeve
- Gas, electric or oil-fired furnace available

THE CLEVELAND AUTOMATIC MACHINE COMPANY

4930 BEECH STREET • • CINCINNATI 12, OHIO

CHICAGO (6) 1408 Civic Opera Bldg. CLEVELAND (14) 1114 NBC Bldg. DETROIT (2) 540 New Center Bldg.
HARTFORD (1) 529 Capital National Bank Bldg. NEW YORK (6) 2402 Singer Bldg.

ONE OF A SERIES OF STORIES ABOUT ALLOYING METALS...WHERE THEY COME FROM AND HOW THEY ARE USED

THE STORY OF MANGANESE

12th CENTURY BEAUTY

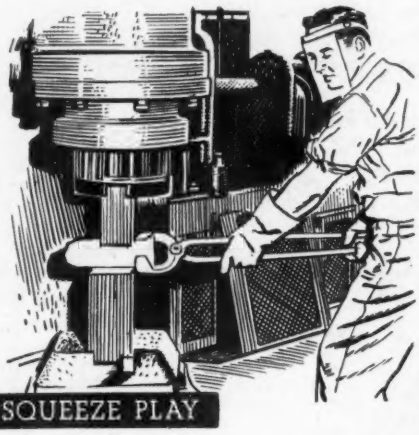
1 Manganese minerals were known in ancient times and were used to produce the rich colors of medieval stained glass windows. However, it was not until 1774 that the metal manganese was isolated. It became important to steelmakers in 1856 when Sir Robert Mushet used it to perfect the bessemer process.

MOVING MOUNTAINS

2 Mountains of manganese ore from various places throughout the world are shipped each year to the United States to help meet our nation's requirements. In Electromet's furnaces, these ores are reduced to ferromanganese, silicomanganese, and other alloys of high purity.

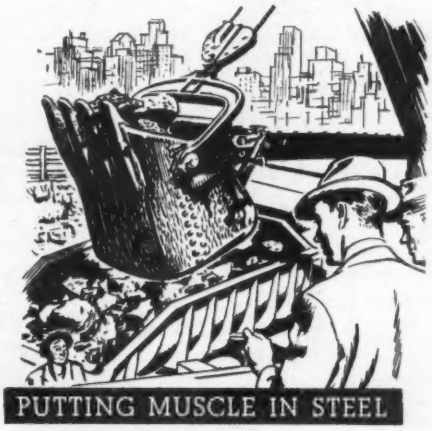
TAMING THE BREW

3 Manganese is the most important alloy used in steelmaking. It has a powerful attraction for oxygen and sulphur — gathering and removing these impurities as a slag during the deoxidizing process. One of the best of all deoxidizers is silicomanganese — a combination alloy of silicon and manganese.



SQUEEZE PLAY

4 By combining with sulphur, manganese removes the principal cause of hot-shortness — thereby giving steel better rolling and forging properties. It imparts great strength and toughness, and that's why all steels—castings, forgings, and rolled products—contain at least small amounts of this metal.



PUTTING MUSCLE IN STEEL

5 Manganese makes steel tough. Steel containing about 13 per cent manganese is "work-hardening," that is, it possesses the property of increasing in hardness as the metal is worked. Steam shovel teeth, crushing machinery, and railroad switch frogs would quickly wear out, were it not for this property.

Aid To Steelmakers

Electromet's staff of experienced and well trained metallurgical engineers are always ready to assist you with the proper use of ferro-alloys, and help you solve other metallurgical problems relating to melting procedures. These men are familiar with the most efficient and up-to-date shop practices. Their specialized knowledge has assisted customers in solving many metallurgical problems. For further information write for our booklet "Electromet Products and Service."

ELECTRO METALLURGICAL COMPANY

Unit of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

ELECTROMET Ferro-Alloys and Metals are sold by Electro Metallurgical Sales Corporation, and Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

Electromet

TRADE-MARK

Ferro-Alloys & Metals

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THE Distributors of Johnson Bronze provide a vital, indispensable service to all types of industry. Their convenient location . . . in every industrial center . . . places adequate stocks of UNIVERSAL Bronze Bars and General Purpose Bearings as near as the user's telephone. Their frequent, personal contacts . . . their competent advice . . . their immediate delivery . . . saves manufacturers thousands of dollars a year. In emergency they are available twenty-four hours a day . . . . . .

By selling Johnson UNIVERSAL Bronze and Johnson General Purpose Bearings, our distributors offer the highest quality bearing bronze available. The wide range of sizes enables the purchaser to buy exactly according to his needs. The uniform high quality guarantees the utmost in performance in long bearing life.

Get to know your local Johnson Distributor. You will find his name in the classified section of your telephone book . . . under BEARING BRONZE. Give him a call TODAY.

General Purpose Bearings... available in over 850 stock sizes... UNIVERSAL Bronze Bars in over 350 sizes, all completely machined.
JOHNSON UNIVERSAL BRONZE
1 3/8 x 2 1/4 JOHNSON UNIVERSAL NEW CASTLE PA USA
BRANCHES IN 18 INDUSTRIAL CENTERS
JOHNSON BRONZE
SLEEVE BEARING HEADQUARTERS

JOHNSON BRONZE COMPANY

550 SOUTH MILL STREET NEW CASTLE, PA.

KEEP IT CLEAN !!!

Welding with G-E CONTROLS gives CLEANER RESULTS, TWICE AS FAST

FOOD MACHINERY CORP. of San Jose, Calif. REPORTS, "We find spot welding with G-E controls twice as fast as any other method for fabricating our food processing machines. And it's a cleaner process with smoother, finished welds."

From splash guards for pear machines to fruit cocktail fillers, G-E controls assure automatic and accurate timing of the welding cycle—faster, more consistent welding.

HERE ARE 4 OTHER ADVANTAGES

- Easy to Operate
- Minimum Maintenance
- Low Upkeep Costs
- Adjustable to Different Gage Metals

SEE

"This Is Resistance Welding," G.E.'s full-color movie explaining what resistance welding is, and where and how it has improved production. Your nearest G-E office, local utility, or resistance welding machinery manufacturer will be glad to arrange a free showing for you.

NEW LINES OF G-E SYNCHRONOUS AND NONSYNCHRONOUS WELDING CONTROLS

1. Control is factory-assembled in one, easy-to-install cabinet
2. Easy servicing through large side door of cabinet
3. Control station always faces operator

For more information on these new lines of G-E welding controls, ask for bulletins GEA-4699 and GEA-4726.

Apparatus Department, Sec. A645-44
General Electric Company
Schenectady 5, N. Y.

Please send me your free bulletins on the new lines of G-E welding controls:

- ☐ GEA-4699, Synchronous Precision Controls for Spot and Projection Welding
- ☐ GEA-4726, Nonsynchronous Electronic Controls for Spot and Projection Welding

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Company.....

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high ratios?

✳ ONE OF 93

DE LAVAL
DOUBLE REDUCTION
WORM GEARS

De Laval double reduction speed reducers, consisting of combinations of double worm gear reductions, or helical and worm gear reductions, are available with overall ratios up to approximately 8000 to 1. De Laval single reduction worm gear speed reducers are available in ratios up to 90 to 1. If high ratios are your requirement, worm gear speed reducers are the answer—particularly if space is limited and reliability is important. A De Laval representative will help you pick the right size and type.

✳ This double reduction De Laval Worm Gear Speed Reducer is available in many standard ratio combinations, with horizontal or vertical output shafts and is but one of 93 sizes of standard De Laval Worm Gear Speed Reducers.

DE LAVAL

Worm Gear Division — **De Laval Steam Turbine Company, Trenton 2, N. J.**

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WG-14

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The WEAN ENGINEERING Company, Inc.
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SPECIALISTS IN SHEET, TIN & STRIP MILL EQUIPMENT

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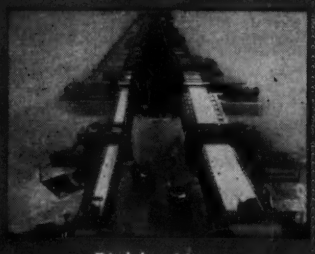
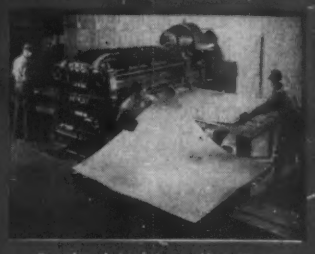
NARROW STRIP AND WIRE MILL MACHINERY

HOLMQUIST BARBED WIRE AND WIRE FENCE MACHINERY


Pickle Line

Tin Plate Shearing

Electrolytic Line


Backed Up Leveller For Wide Sheets

Saving Seconds on Threading Brown & Sharpe Work

Because threading is one of the most common operations in producing metal parts, it is an operation on which saving even a fraction of a second is important.

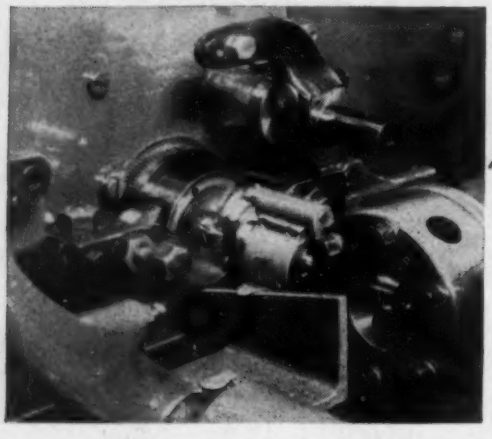
Here, for example, is the Namco Style DBS Head made especially for Brown & Sharpe Automatics.

This equipment threads the brass part shown below at the rate of 1,309 per hour. Consistent accuracy is maintained and The Inland Manufacturing Company of Chicago reports that the ground thread chasers, checked after threading a third of a million parts, showed practically no signs of wear.

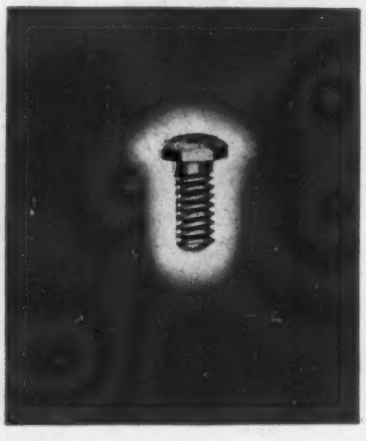
That's a real record of cost-saving in high production. We have thousands more, all made by Vers-O-Tool Dieheads and ground thread Circular Chasers.

This proved Namco method of threading or end-forming and turning may be used on any type of machine.

Catalog D-42-C will give you full details.



Often the saving of a fraction of a second is important in cutting costs on a long run job. When such jobs come up, why not write us for Vers-O-Tool figures on your particular type of work?



The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

WORCESTER PRESTEEL

Lower Costs with Presteel

A new washing machine design* required a cabinet to match other modern kitchen appliances. The original design specified a top made of cast aluminum, but the cost was excessive. Redesigned as a Presteel stamping, the cost was reduced over 50% and the quality was greatly improved.

These stampings (the blanks are nearly 3 feet square) are produced on large mechanical and hydraulic presses. The material is .050″ steel, and the finished top is approximately 25″ square by 3″ deep.

As you look forward to your future stamping problems which require skill and ingenuity plus complete stamping facilities, think of Presteel.

*Made for YOUNG CORPORATION
Fall River, Massachusetts

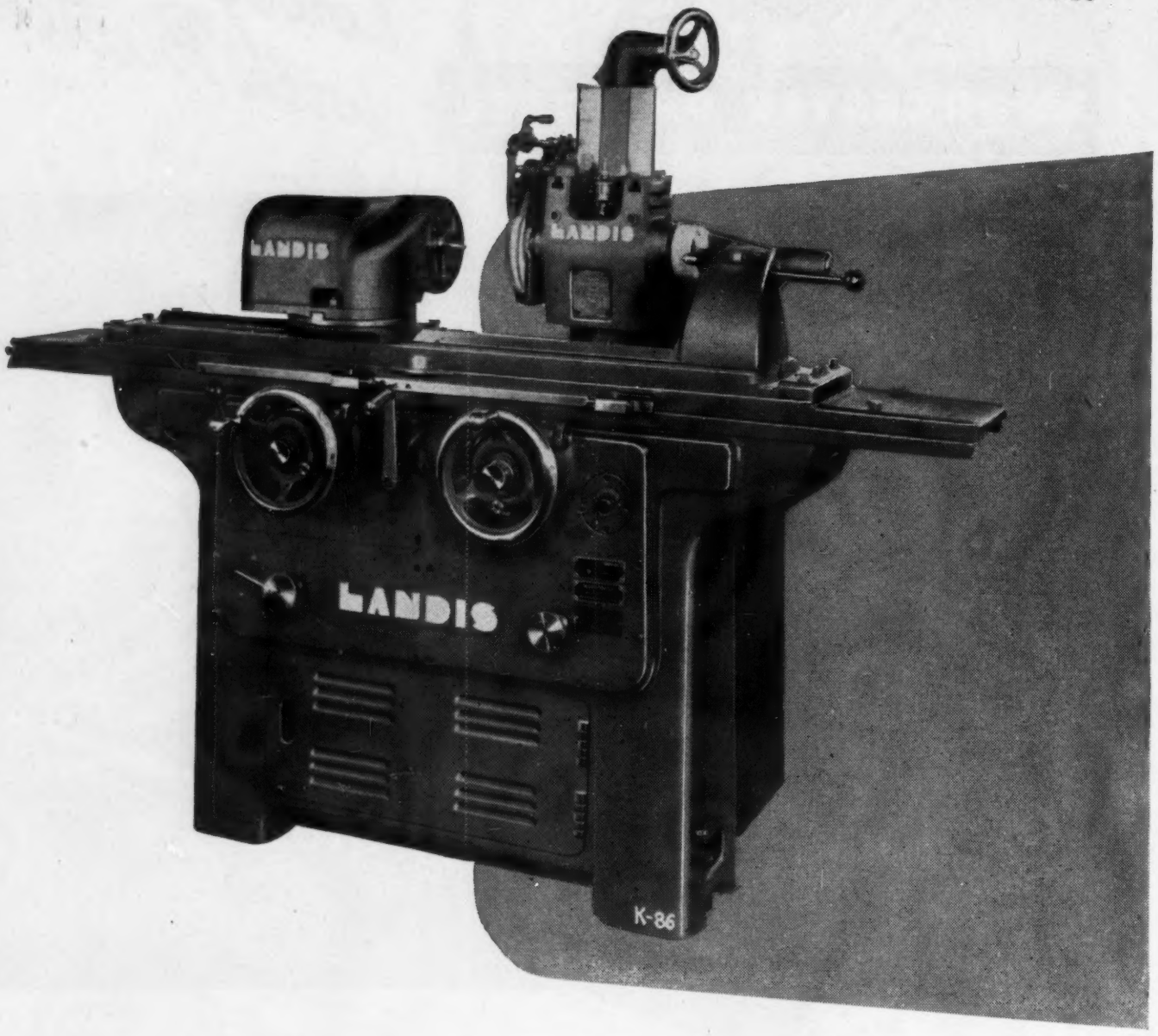
WORCESTER PRESSED STEEL CO.
ALLOY STEELS AND OTHER METALS COLD FASHIONED SINCE 1883

511 BARBER AVENUE, WORCESTER 6, MASS.

Representatives in Alexandria Virginia, Buffalo, Canton Ohio, Chicago, Denver, Detroit, Fort Worth, Indianapolis, Los Angeles, New York, Philadelphia, Syracuse, Toronto.

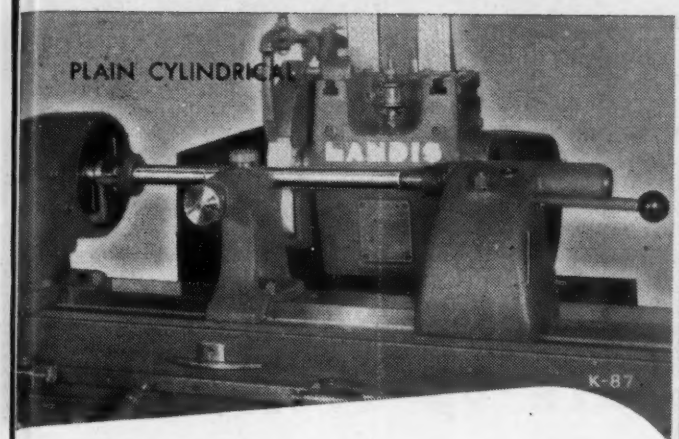
24 Different Precision Grinding Operations

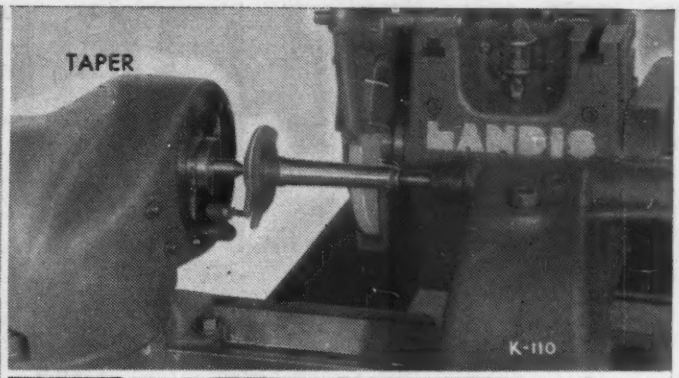
can be done on 12" x 28" universal and tool

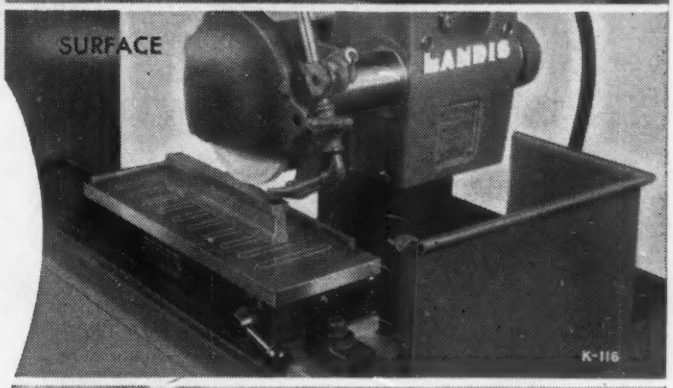


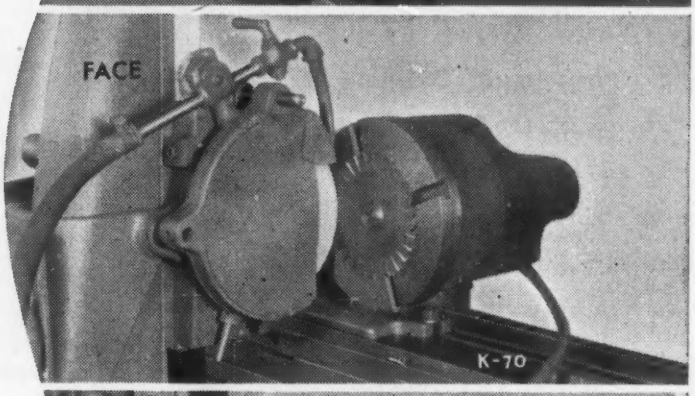
LANDIS TOOL
Precision Grinders

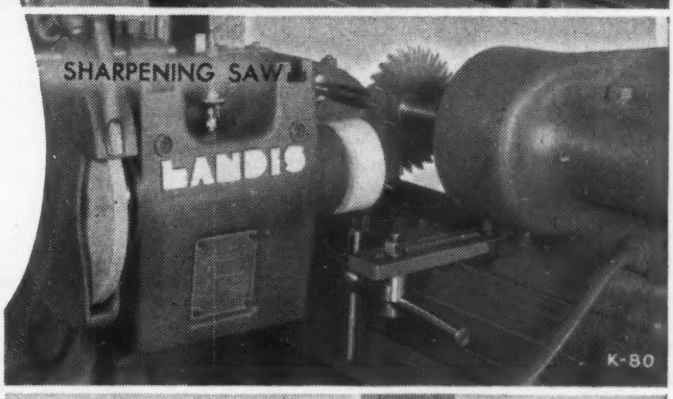
for detailed information, request catalog K-45

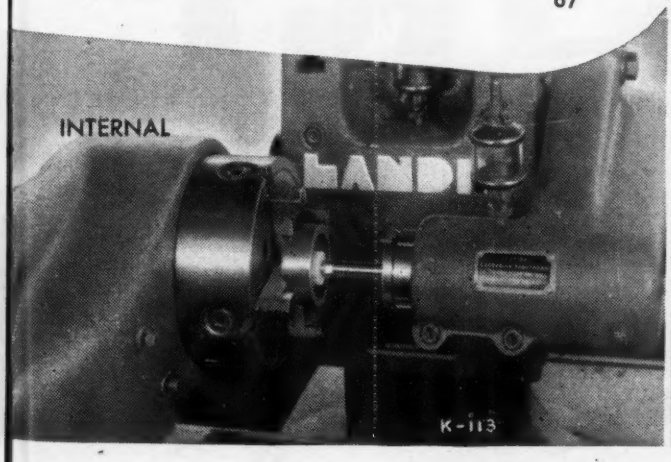












With Standard Equipment

1. **Cylindrical**
2. **Taper**
3. **Face**
4. **Surface** *(operations without attachments only)*
5. **Clearance on Saws, Cutters and Reamers**
6. **Flutes on Taps**
7. **Face of Teeth on Formed Cutters**
8. **Spiral Mill Grinding**

With Optional Accessory Equipment

9. **Milling Cutters**
10. **Wet Grinding**
11. **Dry Grinding**
12. **Internal Grinding**
13. **Hobs** *(right or left hand)*
14. **Parallel Blocks, Flat Forming Tools and Dies**
15. **Surface Grinding** *(quantity lots)*
16. **Screw Machine and Other Forming Tools**
17. **Angular Wheel Face**
18. **Reamers, Taps and Form Cutters**
19. **Gear Cutter** *(staggered or straight teeth)*
20. **Cylindrical Work Requiring Work Rest**
21. **Face Mills** *(up to 18½" diameter)*
22. **End Mills** *(with taper holding attachment only)*
23. **Drills** *(from 3/32" to 1½" diameter)*
24. **Saws** *(from 7½" to 26" diameter)*

67

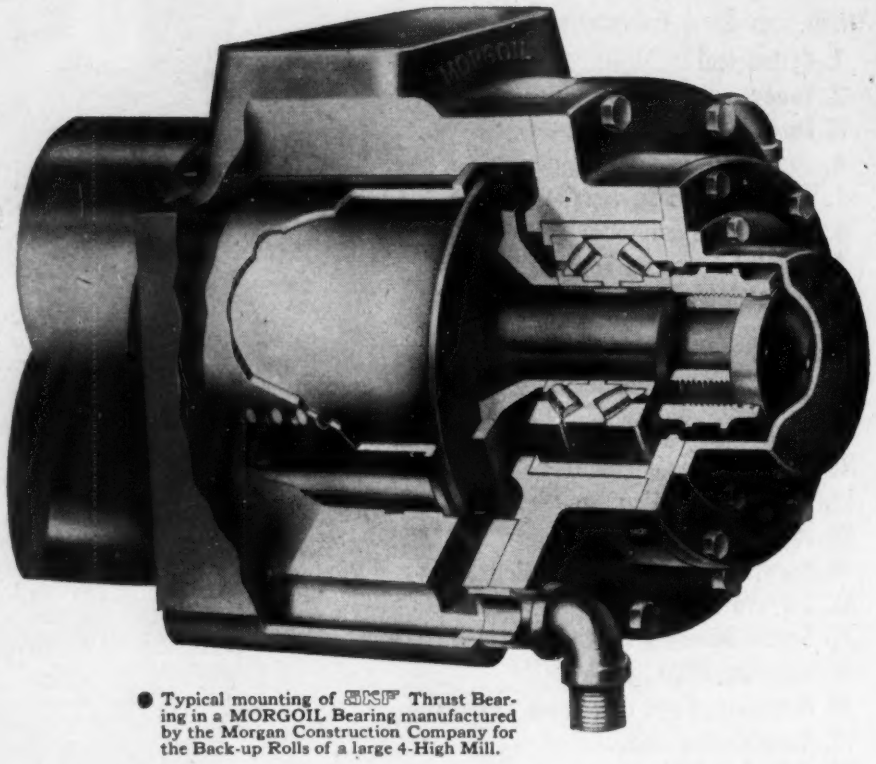
LANDIS TOOL COMPANY, WAYNESBORO, PA.

PREFERRED

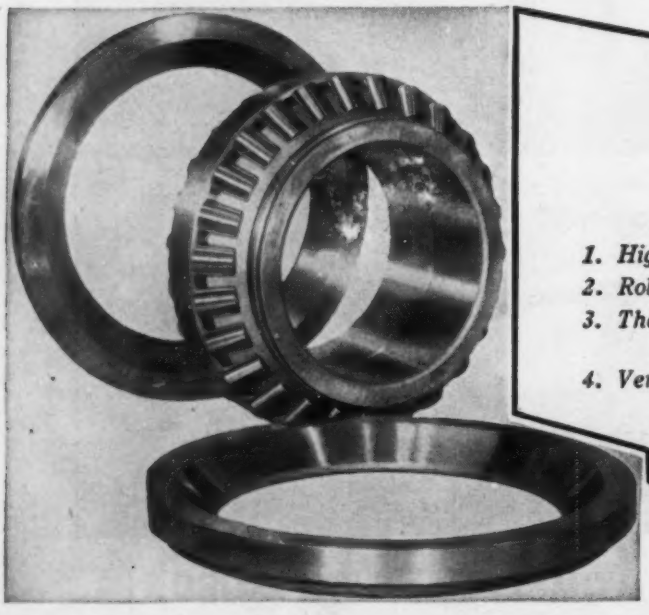
for Back-up THRUST

Four years ago SKF, the pioneer in the application of spherical roller bearings to rolling mills, developed the double directional adaptation of its spherical roller bearing for use as the thrust unit in MORGOIL Bearings manufactured by the Morgan Construction Company. First installed on the back-up rolls of a modern 4-High 80" hot strip mill, its ability to carry heavy thrust loads has made it the logical choice for the newest hot strip mills and high speed cold mills now being installed. 6322

SKF INDUSTRIES, INC., Phila. 32, Pa.



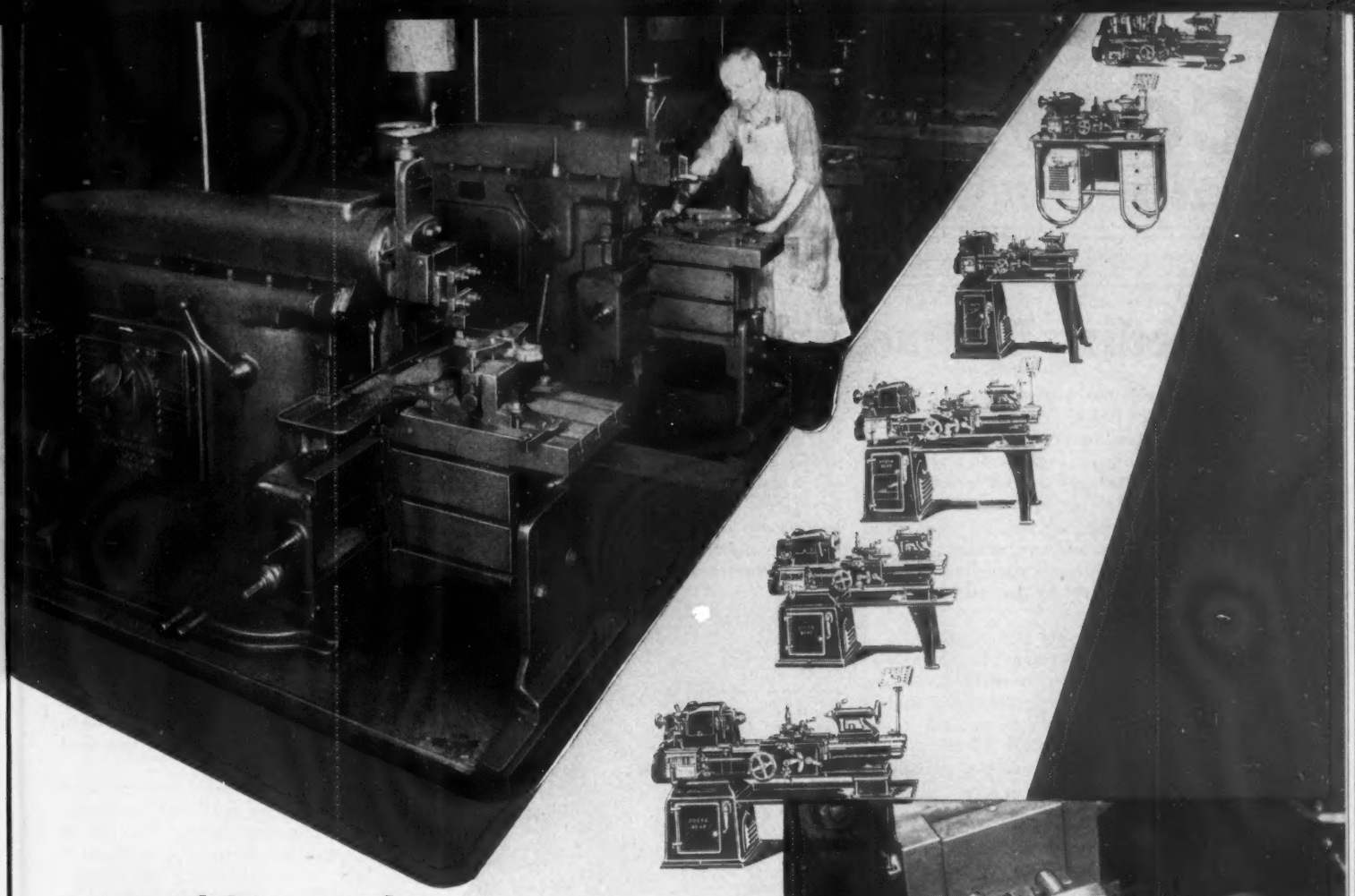
● Typical mounting of SKF Thrust Bearing in a MORGOIL Bearing manufactured by the Morgan Construction Company for the Back-up Rolls of a large 4-High Mill.



SKF

SPHERICAL ROLLER THRUST BEARINGS

1. *High thrust capacity.*
2. *Rolling alignment.*
3. *The ability to run at sustained high speeds.*
4. *Very low friction torque.*



machine tools
to help make machine tools

It's generally conceded that the most critical buyers of machine tools are the machine tool builders themselves. The South Bend Lathe Works are typical.

Should you go through the South Bend plant you would see Rockford Hy-Draulic Shapers applied to many different types of work. For example, one job involves a difficult shoulder cut on a Change Gear Bracket. Two shoulders are cut at one time . . . up to a blind shoulder. Tolerances of plus or minus 0.001″ are maintained. No further finish is required on the part.

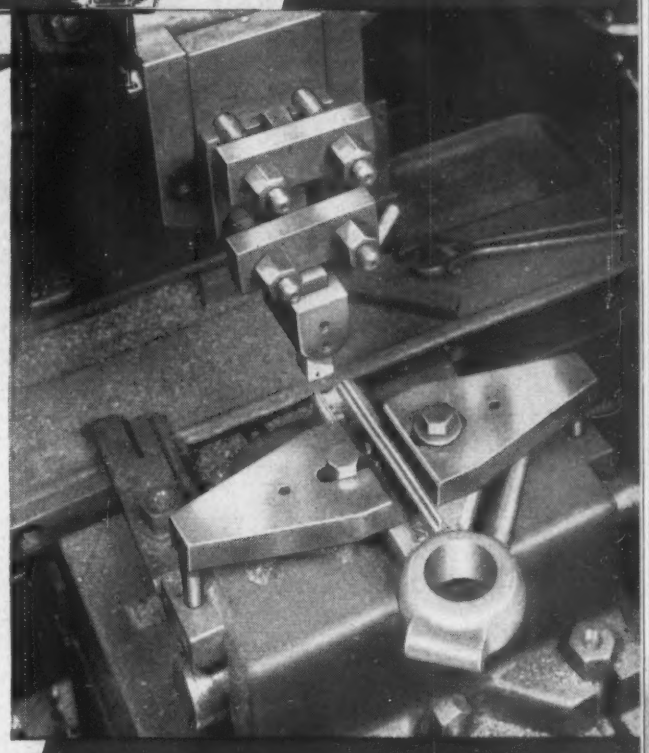
Accuracy of the Rockford Hy-Draulic Shaper ram stroke in maintaining the plane and length of the cut with precision accuracy, makes it the ideal machine for the job. High cutting and return stroke speeds result in fast production and lower costs.

Take a tip from the machine tool builders . . . compare and be critical of the machines you buy. When you do this, your choice in Shapers is bound to be a Rockford Hy-Draulic. Write for complete information and Catalog 1947.

ROCKFORD MACHINE TOOL CO.
ROCKFORD ILLINOIS

SALES AND SERVICE OFFICES: Atlanta • Baltimore • Cambridge • Chicago Cleveland • Dallas • Dayton • Denver • Detroit • Hartford • Honolulu Houston • Indianapolis • Kansas City • Los Angeles • Milwaukee Minneapolis • Moline • Newark • New Orleans • Philadelphia Pittsburgh • Richmond • St. Louis • Salt Lake City • San Francisco Seattle • Shreveport • South Bend • Syracuse • Tulsa • Worcester.

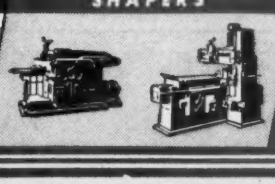
4708



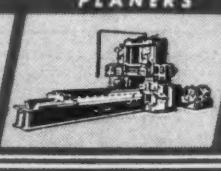
Because of Hy-Draulic design, Rockford Shapers give you speed, accuracy, and ease of operation in all types of shaper work. These elements combined mean lower costs in production or in tool room or maintenance work. Rockford Hy-Draulic Shapers are built in 12″, 16″, 20″, 24″ special, 24″ and 28″ sizes; Openside Shapers in 36″ size.

Hy-Draulic

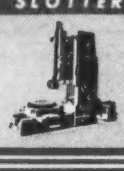
SHAPERS



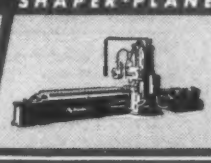
PLANERS



SLOTTERS



SHAPER-PLANERS



COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by Bridgeport Brass Co. "Bridgeport" *Headquarters for BRASS, BRONZE and COPPER*

Speeding Up Machining Operations

The remarkable success of the recent Machine Tool Exhibit held in Chicago is significant. Manufacturers continue to turn to better and bigger machines in trying to maintain production costs at a sensible level in spite of rising labor costs.

Lower unit costs can also be obtained by speeding up machining operations. This involves the selection of proper basic materials which are used in the manufacture of metal goods.

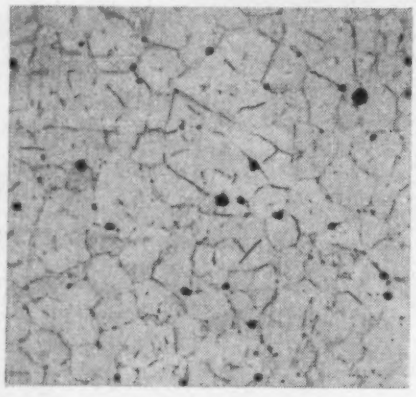
It is a well-known fact that copper-base alloys are among the easiest to fabricate because they can be readily drawn, stamped, formed, forged, machined and soldered with minimum wear and tear on tools and equipment. A slight modification in composition and temper can quickly improve existing properties.

Lead Improves Machinability

The addition of varying amounts of lead to brass, bronze and nickel silver will quickly speed up machining operations involving the removal of excess metal, drilling, tapping, etc. Leaded metal can also be blanked more accurately as for example, delicate wheels and parts for watches and clocks.

Most non-leaded copper-base alloys generate curly, stringy, chips which cling to the tool and work and tend to clog the machine. The addition of even small amounts of lead to the alloy has a pronounced effect on the character of the chips. A small amount of lead causes the chips to break apart more easily. A large amount causes the chips to crumble and resemble sawdust. When sufficient lead is added to brass rod of the correct composition and temper it can be cut faster than any screw machine can operate. Bridgeport's Ledrite† brass rod is an outstanding example of high speed machinability.

Lead does not dissolve in copper and its alloys. It is found as tiny particles or spheroids scattered throughout the metal.



Photomicrograph of brass rod containing about 1.7% lead. (Magnified 200 X)

Since lead exists as a mechanical mixture it breaks the continuity of the matrix in which it is found. It also reduces its ductility and affects the hot workability of metals — not so much with Muntz metal (brass with about 60% copper and 40% zinc) but 70-30 brass, silicon bronze and copper itself.

Where a compromise between much ductility plus some machinability is required, small amounts of lead from 0.15% to .50% are added. Brass strip for drawing which also requires drilling and threading, or wire for making hollow rivets, often contains a small amount of lead.

The word machinability has never been clearly defined. Some operators are most interested in surface finish and in close dimensional tolerances; others in the maximum cutting speed attainable. Relatively few are much concerned with power consumption. All desire to obtain maximum tool life and operation at the highest pos-

†Trademark.

(Continued on following page, column 1)

Reprints Available

Beginning with this issue the Copper Alloy Bulletin will be published every month as a two-page spread instead of an insert. However, as in the past, each issue will be reprinted in convenient insert form on India coated paper for mailing to those on our regular mailing list. If you would like to have your name added to this list, drop a note to Bridgeport Brass Company, Bridgeport 2, Conn.

Any suggestions you may have for improving the Bulletin as a source of information on copper-base alloys will be gratefully received.

Nominal Analysis and Properties		BRASS STRIP: Light Leaded Brass 40	Low Leaded Brass 3	Medium Leaded Brass 63	High Leaded Brass 62	Lancashire Brass 65	ROD FOR MACHINING: Ledrite 6	Naval Brass Medium Leaded 28	Leaded Com. Bronze 89	ROD FORGING: Bridgeport Forging Rod 133	WIRE: Light Leaded Brass 43
ANALYSIS											
Copper	%	65.5	66.0	66.0	62.25	73.0	61.00	60.0	89.5	59.50	65.0
Lead	%	0.2	0.7	1.0	2.0	2.5	3.4	0.6	2.0	1.75	.3
Tin	%							0.75		.20	
Zinc	%	34.3	33.3	33.0	35.75	24.5	35.6	38.65	8.5	38.55	34.7
MECHANICAL PROPERTIES											
Ten. Strength psi	Hard*	74,000	74,000	74,000	74,000	77,000	58,000	75,000	52,000	72,000	65,000
	Soft	49,000	49,000	49,000	49,000	50,000	49,000	57,000	37,000	52,000	50,000
Yld. Strength psi (@ ½% extens. under load)	Hard*	60,000	60,000	60,000	60,000	75,000	45,000	53,000	45,000	50,000	
	Soft	17,000	17,000	17,000	17,000	18,000	18,000	25,000	12,000	20,000	
Elongation % in 2"	Hard*	8	8	7	7	5	25	20	18	50	25
	Soft	57	57	54	52	55	53	47	45	45	60
Rockwell Hardness	Hard*	B80	B80	B80	B80	B83	B78	B82	B58	B78	
	Soft	F68	F68	F68	F68	F70	F68	B55	F55	F78	
PHYSICAL CONSTANTS											
Melting Pt. (Liq) °F		1710	1700	1700	1670	1769	1650	1650	1900	1,640	1710
Density, lbs./cu. in.		.306	.306	.306	.306	.309	.307	.304	.319	.305	.306
Coeff. Therm. Exp. per °F from 77° F to 572° F x10-6		11.3	11.3	11.3	11.3	10.9	11.4	11.8	10.2	11.5	11.3
Thermal Conduct. Btu/sq ft/ft/hr/°F @ 68° F		67	67	67	67	71	67	67	104	69	67
Elec. Cond. % IACS @ 68° F Soft		26	26	26	26	28	26	26	42	27	27
Mod. of Elas. (Tension) psi.		15,000,000	15,000,000	15,000,000	15,000,000	15,000,000	14,000,000	15,000,000	17,000,000	14,000,000	15,000,000
FABRICATION PROPERTIES											
Machinability Rating**		50	60	70	90	90	100	50	80	80	50
Cold Working		E	E	G	F	F	P	P	G	F	E
Hot Working		P	P	P	P	P	F	E	P	E	P
Hot Working Range °F							1300-1450	1200-1400		1200-1500	

*Hard temper—values are for wire of commercial hard drawn temper. **Machinability rating—free cutting brass=100.
E—Excellent. G—Good. F—Fair. P—Poor. All figures are nominal values and should not be used as specifications.

Speeding Up Machining Operations

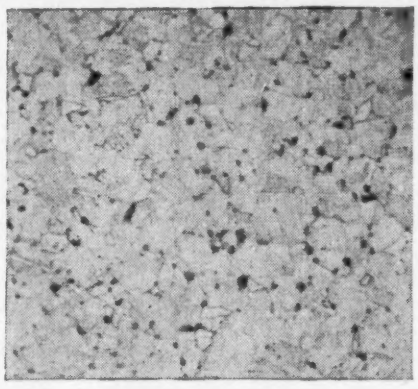
(Continued from preceding page)

sible speeds. In past years it has been considered desirable that the chips break up finely so as to be readily removed to avoid fouling of the tool.

Fabricator and Laboratory Must Work Together

The machining behavior of leaded copper-base alloys involving speed of cutting and smoothness of finish (freedom from chatter marks) is influenced by a number of variables such as composition, microstructure and temper, which in turn must be closely controlled during mill production and processing. Only in this way can material of the quality and uniformity necessary for high speed mass production, with highest accuracy and fine finish, be attained.

Today, with its rapidly changing conditions, close contact between the fabricator



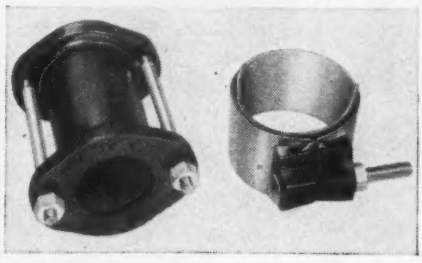
Photomicrograph of brass rod containing about 3.5% lead. (Magnified 200 X)

and the laboratory is more necessary than ever. Mass production with low unit cost depends largely upon the use of metal with "made-to-order" properties designed for the job in question. Bridgeport's Laboratory has long experience in working closely with customers on their metal problems. Call on us for help to reduce your costs or improve your product. Much information on available alloys and their properties is also found in Bridgeport's Technical Handbook. Have you a copy for quick reference?

DURONZE III IN PIPE CLAMPS AND COUPLINGS

Bolts used for repair clamps and couplings made by Smith-Blair, Inc., San Francisco, Calif., must stand up to severe corrosive conditions. Bridgeport's Duronze* III (Silicon Aluminum Bronze) has given excellent service in this application, not only with respect to the service conditions it must satisfy, but from the standpoint of manufacturing economy as well.

Smith-Blair engineers say, "We selected Duronze III for our bolts because of its unusually high strength and excellent corrosion resistance. Duronze III stands up



Flexible coupling and repair clamps made by Smith-Blair, Inc. Duronze III is used for the bolts.

better than brass or copper and most of the non-ferrous alloys when subjected to corrosive solutions—especially dilute acids, sewage, sea water and many liquids used in process industries. When soil conditions destroy steel or brass bolts on clamps or couplings, the use of Duronze III will eliminate bolt failure."

Not only is strength gained by the use of Duronze III, which is 50% stronger than annealed brass, but dead weight can also be reduced, since it is 9% lighter. It is readily machined, cutting from 50% to 75% as fast as free-cutting brass. Hot forgings, much stronger than hot-forged brass or silicon bronze, can be produced easily. Therefore, its field of application is wide, ranging from bolts and nuts to high-strength gears, pinions, valve parts, wire and cable connectors and marine and building hardware.

**Reg. U. S. Pat. Off.*

NEW DEVELOPMENTS

This column lists items manufactured or developed by many different sources. None of these items has been tested or is endorsed by the Bridgeport Brass Company. We will gladly refer readers to the manufacturer or other sources for further information.

Universal Grinder is said by manufacturer to feature hydraulically actuated tables even when manually controlled. Either the internal or external type machine can be equipped with two heads to provide combination internal-external grinder. Both can grind work up to 9" diameter. Table has infinite speed changes up to 100 ipm, oscillates full 10" down to 1/32". **No. 801**

Automatic Oil Refiner is reported to remove all foreign solids—dirt, carbon, sludge, grit, abrasives, metal particles—as well as foreign liquids, such as gasoline, kerosene, sulphuric acid and water from industrial lubricating oil. Cost is said to be about 20 cents per gallon. Automatic cycle handles 3½ gallons of drained oil per batch and as much as 90 gallons per 8-hour day. **No. 802**

Improved Milling Fixture holds round, hexagonal, octagonal or square stock securely for machining, it is claimed. Used in pairs, they can be set up in vertical or horizontal position to grip work on bottom as well as back. Stock is said to be aligned with machine automatically when setup is completed. **No. 803**

Adjustable Jig which manufacturer claims can be assembled easily and accurately into an infinite variety of jig and fixture patterns facilitates drilling, reaming and hole-layout. Recommended for use as an accurate method of transferring hole locations, as master setup for coordinating drill jigs, or as temporary jig while production jigs are being made. **No. 804**

Work-Holding Device is reported to facilitate grinding of all types of lathe tools. Four graduated quadrants permit fast, accurate setting of any simple or compound angle. **No. 805**

Duplex Sediment Strainer designed for use in pipe lines where continuous flow is imperative, can be cleaned by diverting flow from one basket into another without interrupting fluid passage through unit. Unit is controlled by single plug type valve whose orifices direct flow from inlet to either or both baskets. **No. 806**

Bar Feed Attachment designed to operate on many types of screw machines, utilizes liquid coolant of screw machine to supply steady impulse pressure for bar feed-out. Attachment is said to have many advantages such as quiet operation, reduction of scrap material, fast operation and minimum of maintenance or parts replacements. **No. 807**

Reprints of the Copper Alloy Bulletin will be mailed regularly on request.

BRASS, BRONZE, COPPER, DURONZE, NICKEL SILVER, CUPRO NICKEL

Warehouse Service with Slitting Facilities in Principal Cities

STRIP AND SHEET—For drawing, stamping, forming, spinning. Leaded alloys for machining, drilling, tapping. Silicon bronze, phosphor bronze for corrosion resistance. Alloys suitable for springs. Engravers' copper and brass.

WIRE—Cold Heading alloys for screws, bolts, nuts, nails, fastenings, electrical connectors, Phono-Electric trolley and contact wires.

ROD—Alloys for screw machine operation. Duronze III high strength, corrosion-resistant, good for machining and hot forging. Hot forging and cold heading alloys. Welding Rods. Copper-covered ground rod.

TUBING—For miscellaneous fabrication. For condensers and heat exchangers. For water, air, oil and hydraulic lines.

DUPLEX TUBING—for conditions too severe for a single metal or alloy.

PIPE—Brass and copper for plumbing.

FABRICATED GOODS—Plumbing brass goods. Radiator air valves. Aer-a-sol insecticide dispensers. Automobile tire valves.

TECHNICAL SERVICE—Staff of experienced, laboratory-trained men available to help customers with their metal problems.

WAREHOUSE SERVICE—Warehouse and jobbers stocks available for prompt delivery in principal cities.

TECHNICAL LITERATURE—Manuals and handbooks available for most products.

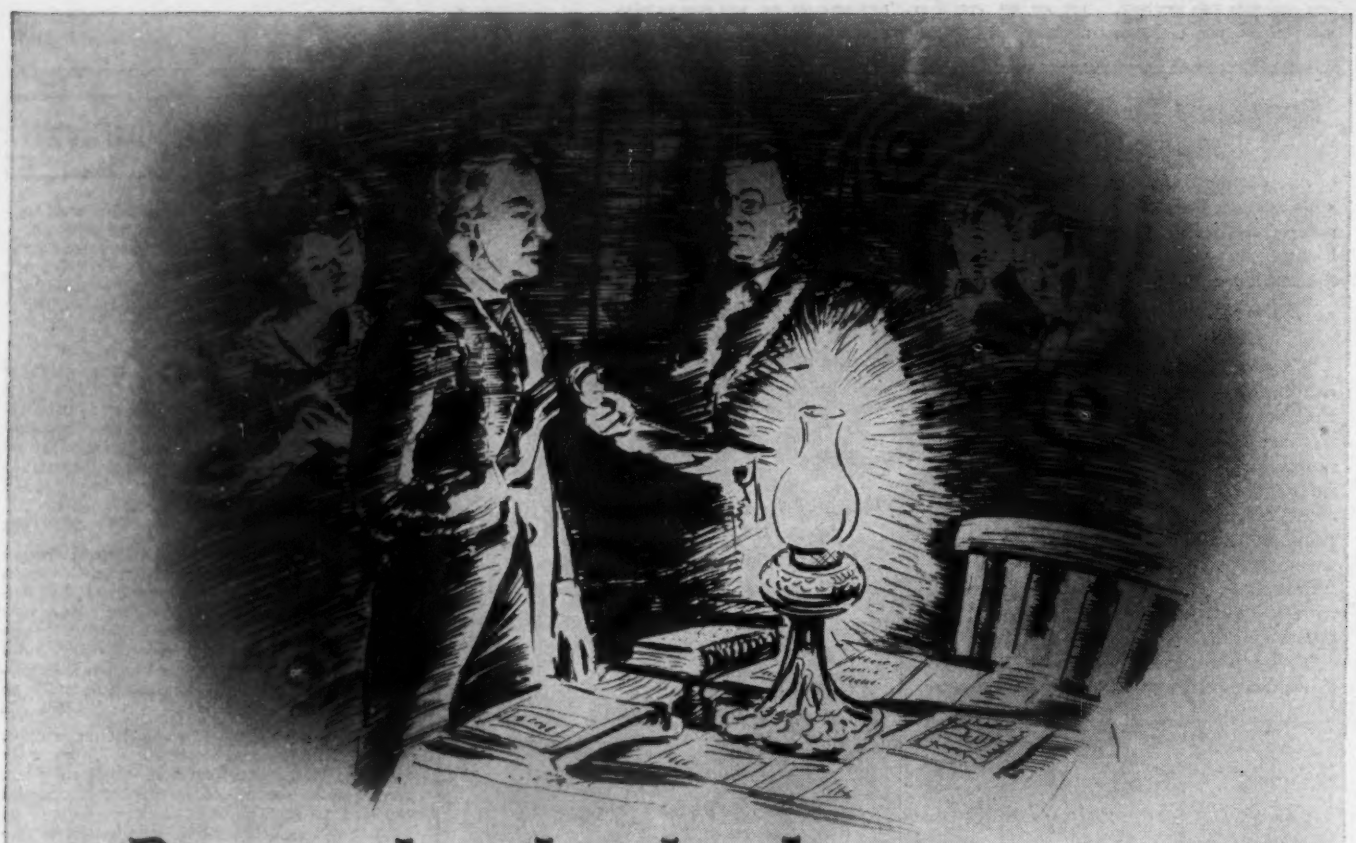
"Bridgeport" BRASS

BRIDGEPORT BRASS

BRIDGEPORT BRASS COMPANY, BRIDGEPORT 2, CONN. • ESTABLISHED 1865

Mills at Bridgeport, Connecticut, and Indianapolis, Indiana • In Canada: Noranda Copper and Brass Limited, Montreal

Advertisement



Remember back when...

Coolidge was sworn in by lamplight . . . the country was emerging from the depression following World War I . . . the Hunchback of Notre Dame and Scaramouche were movie hits . . . King Tutankhamen's tomb was opened . . . Clarence Darrow and William Jennings Bryan debated the theory of evolution . . . radio news broadcasting started, and headphone receiving sets were fashionable . . . Emile Coué treatments prescribed repeating, "Every day, in every way, I am getting better and better".

All of these events came close to the birth of BAY STATE, November 1, 1922.

Since these early '20 days, the research and engineering facilities of Bay State have introduced many improvements and refinements in grinding wheels, and we are rightfully proud of our contributions to American industry.

From a small beginning, to our present world-wide distribution, comes convincing proof of the acceptance of Bay State's complete line of high quality abrasive products.

With sincere thanks to our customers and friends who made this growth possible, we salute the past and eagerly look forward to the future.

BAY STATE *25th Anniversary*

REG. U. S. PAT. OFF.

Top Performance Consistently Duplicated

BAY STATE ABRASIVE PRODUCTS CO. • WESTBORO, MASSACHUSETTS, U.S.A.

Get These 7 Features in Your Automatic Lathe... for Low-Cost Turning of *BOTH* Short and Long Runs

Many manufacturers are now getting the advantages of multiple tooling and automatic cycling on short-run, as well as on mass production turning . . . with Sundstrand Automatic Lathes.

The following seven important design features of these Automatic Lathes will make it possible for you to obtain these same benefits:

1. QUICK CYCLE CHANGEOVER
So the adjustments for various sizes and types of parts can be made rapidly with a minimum of down-time.

2. SIMPLICITY OF TOOL ADJUSTMENT
So that operators or set-up men can readily learn to make tool set-ups and changeover.

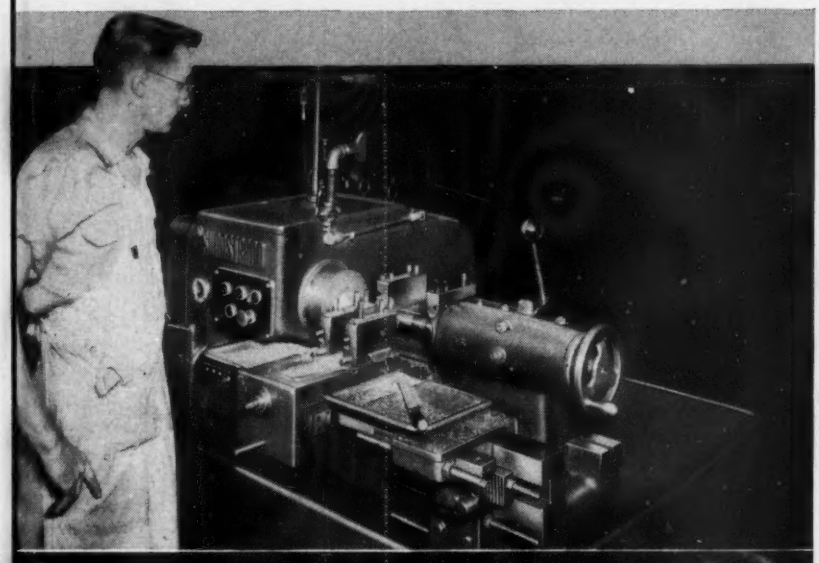
3. WIDE RANGE OF CARRIAGE CYCLES
Easily adjusted for many different sizes of parts and types of tool uses.

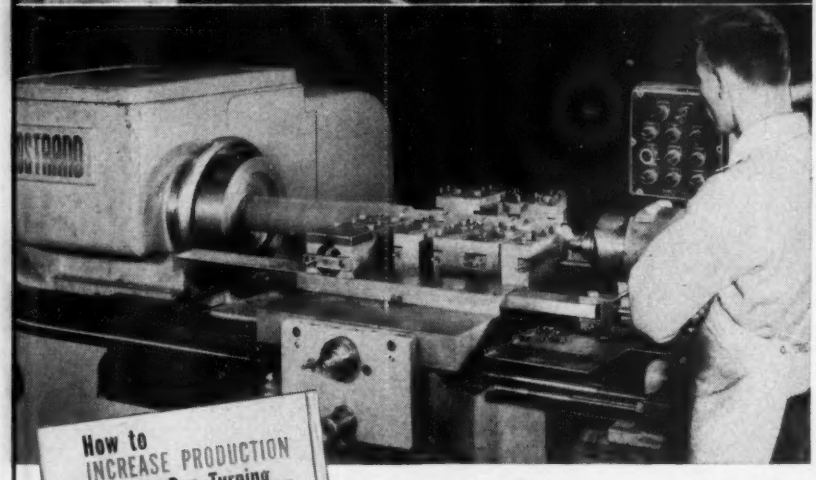
4. WIDE FEED AND SPEED RANGE
Suitable to cover a wide range in size of parts to be machined.

5. ADEQUATE HORSEPOWER
So that multiple tooling can be used to shorten cutting time; also so that cemented carbide and other modern cutting tools can be used to capacity.

6. AUTOMATIC CYCLING
For accurate duplication to close limits of all parts in the lot. Also so that operator can, on occasion, run more than one machine.

7. HIGH RAPID TRAVERSE RATE
So that cutting tools can be advanced to the cut and returned after the cut in the least possible time.





SUNDSTRANDS Have These Features for Work in Any Lot Size

Yes, all of the seven foregoing features are included in each Sundstrand Automatic Lathe. Probably of greatest importance of these features is the quick cycle changeover. It makes it highly practical to include short runs on multiple tooled jobs. On an average job, using five tools, a Sundstrand can be set up in less than thirty minutes.

. . . in Machines Ranging in Capacity up to 17½" Swing

The complete line of Standard Sundstrand lathes consists of the Models 4, 8, 10, 12 and 16. In addition, center drive lathes and special lathes can be furnished to suit special job requirements.

...within Range of 3 to 75 Horsepower

You'll find plenty of horsepower for your tougher jobs or a horsepower range to suit your work in Sundstrand Automatic Lathes. The complete line of five machines embraces a horsepower range of from 3 to 75 h.p.

FREE Additional Proof

Over 20 different turning jobs are described in this 44 page booklet. You will find valuable production data to compare with your present equipment. Short-run, mass production and special turning jobs are all described in detail. Write for your copy today. Ask for Booklet No. 765. For a preliminary analysis send blueprints and production requirements.

SUNDSTRAND MACHINE TOOL CO. · ROCKFORD, ILLINOIS U.S.A. ·

SUNDSTRAND
MACHINE TOOL COMPANY
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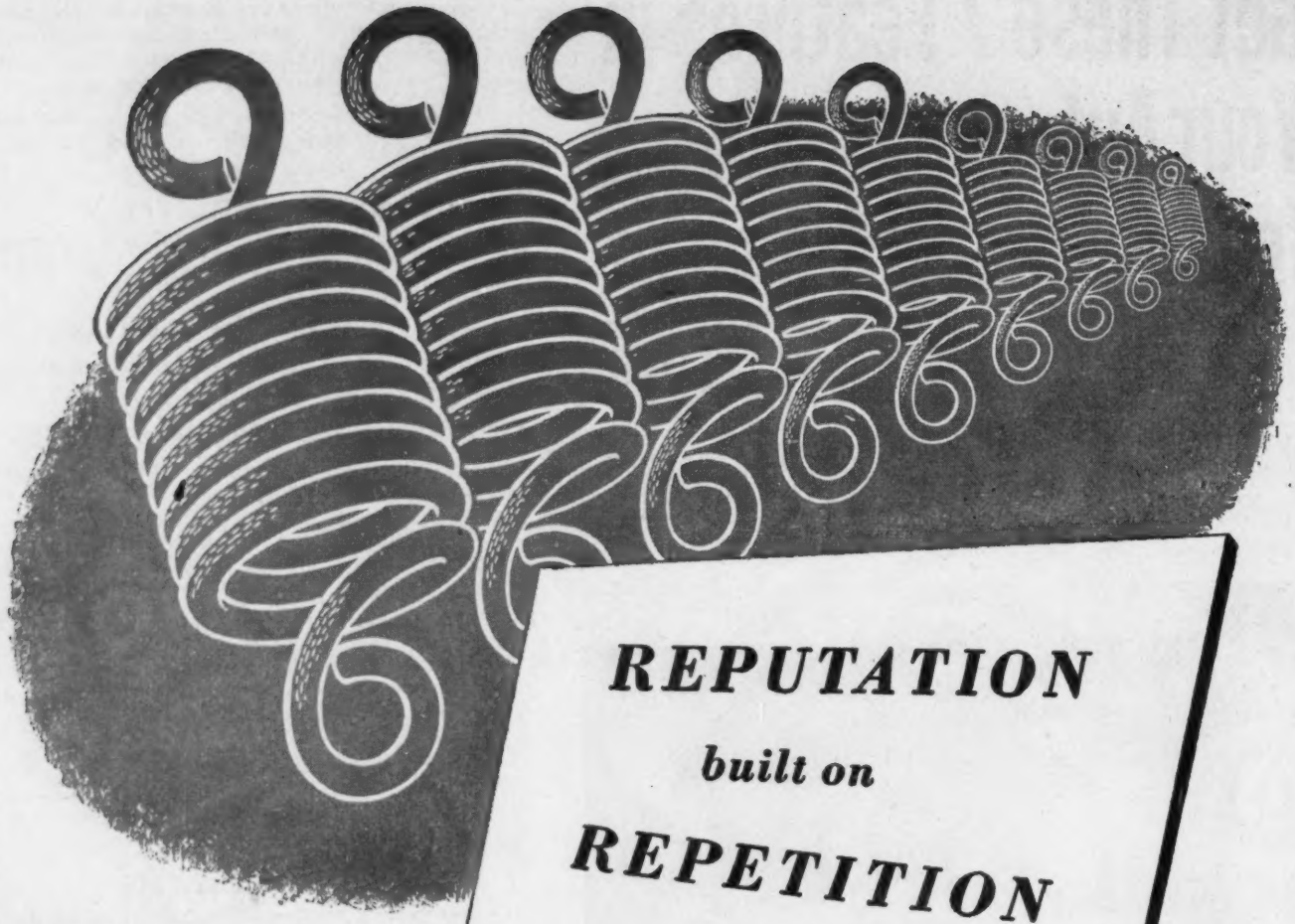
RIGIDMILS • AUTOMATIC LATHES • SPECIAL MILLING AND TURNING MACHINES



REPUTATION
built on
REPETITION

. . . that's right . . . repetitive spring action that gives mechanisms life, pep and power . . .

Uniformity to specifications on repeat orders . . .

Job engineering that results repeatedly in production savings on simple or complex spring designs.

Barnes customers are usually "repeat" customers . . . the reasons for which our representatives will be glad to tell. Ask them at the first opportunity.

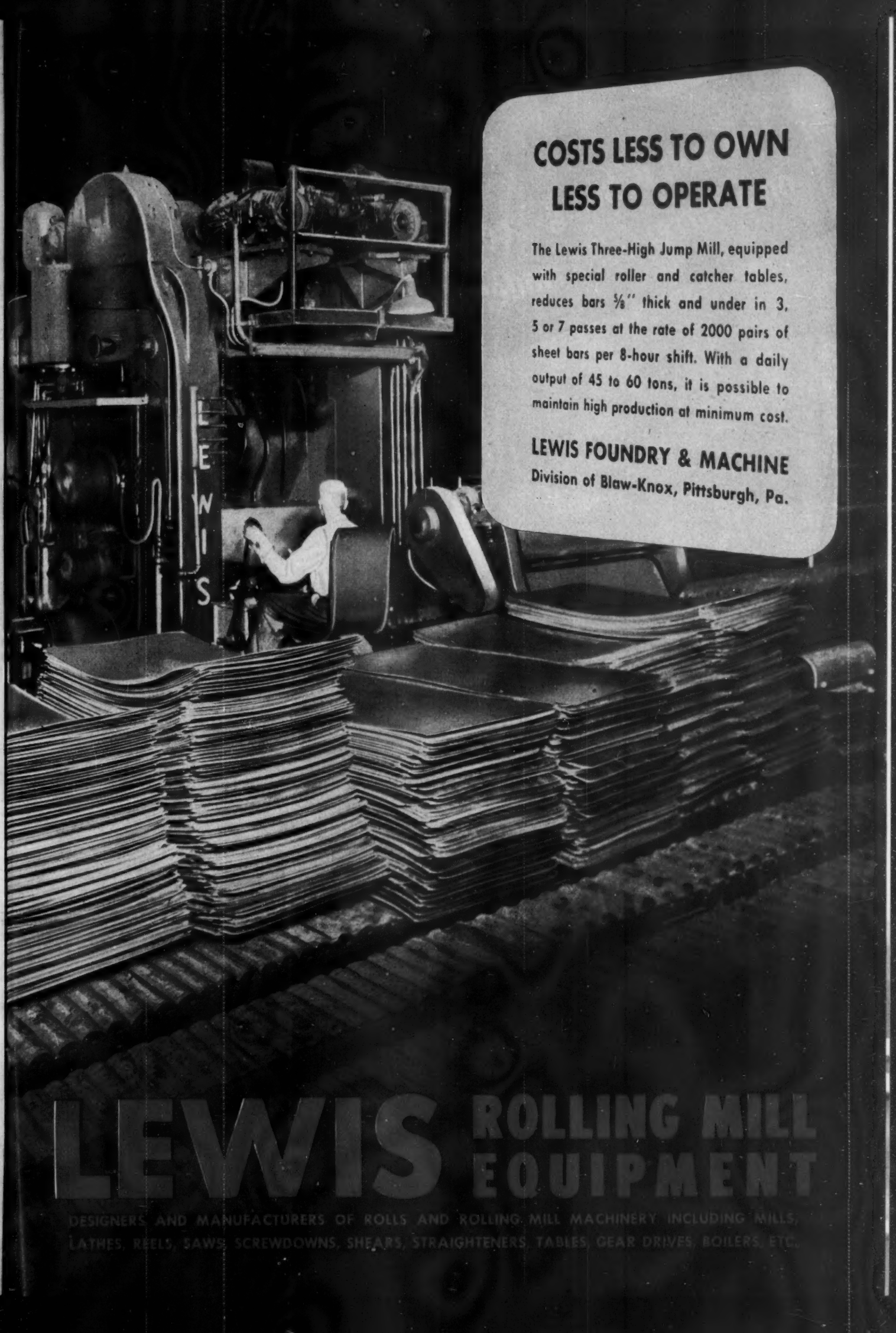
Wallace Barnes SPRINGS

SMALL STAMPINGS • WIRE FORMS • HAIRSPRINGS • COLD ROLLED SPRING STEEL

WALLACE BARNES COMPANY
BRISTOL, CONN.

DIVISION OF THE ASSOCIATED SPRING CORP.

AND IN CANADA, THE WALLACE BARNES CO., LTD., HAMILTON, ONTARIO



COSTS LESS TO OWN
LESS TO OPERATE

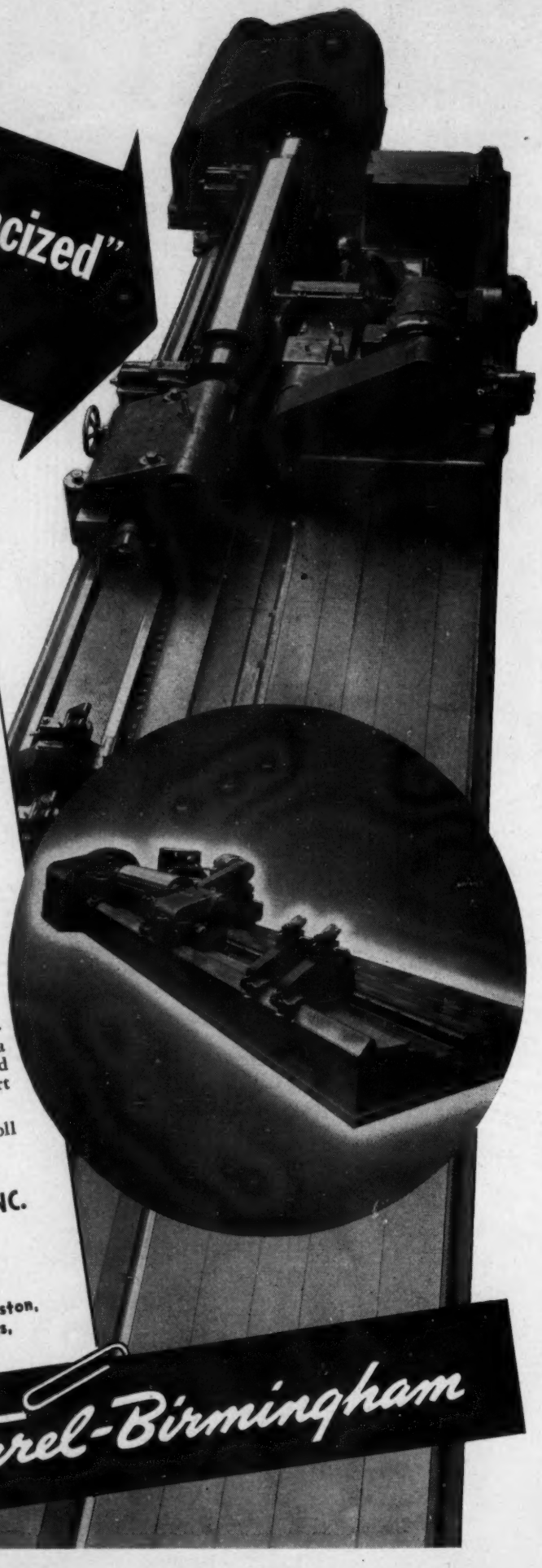
The Lewis Three-High Jump Mill, equipped with special roller and catcher tables, reduces bars ⅝" thick and under in 3, 5 or 7 passes at the rate of 2000 pairs of sheet bars per 8-hour shift. With a daily output of 45 to 60 tons, it is possible to maintain high production at minimum cost.

LEWIS FOUNDRY & MACHINE
Division of Blaw-Knox, Pittsburgh, Pa.

LEWIS ROLLING MILL EQUIPMENT

DESIGNERS AND MANUFACTURERS OF ROLLS AND ROLLING MILL MACHINERY INCLUDING MILLS, LATHES, REELS, SAWS, SCREWDOWNS, SHEARS, STRAIGHTENERS, TABLES, GEAR DRIVES, BOILERS, ETC.

This roll is being "accuracized" on a Farrel 60" Grinder



With the Farrel Type HD, Heavy Duty Roll Grinder it is a simple matter to grind rolls to required accuracy and finish. The more important design features that contribute to *automatic precision* include:

AUTOMATIC CROWNING AND CONCAVING DEVICE—This built-in "brain" automatically produces a mathematically accurate curve for either a crowned or concaved roll, with both halves perfectly symmetrical. The same setting invariably produces exactly the same curvature.

GRINDING WHEEL SPINDLE—Of large diameter for rigidity under working load—made of high grade alloy steel, heat-treated and precision ground—mounted in adjustable bearings, automatically lubricated.

WHEEL SPINDLE AND HEADSTOCK DRIVES—Work and wheel are both driven through multiple V belts. Their smooth, vibrationless transmission of power safeguards precision.

TWO DEAD CENTERS—Dead centers in both headstock and footstock insure concentric rotation of the work, which contributes to precision grinding of journals and bodies.

INVERTED V WAYS—Cast separately from the bed, of a special grade of alloy iron, they are exceptionally resistant to wear, maintaining accuracy for a long life. Automatically pressure-lubricated and covered by flexible metal guards to exclude dirt and grit.

For the complete story of the Type HD Roll Grinder, send for descriptive bulletin.

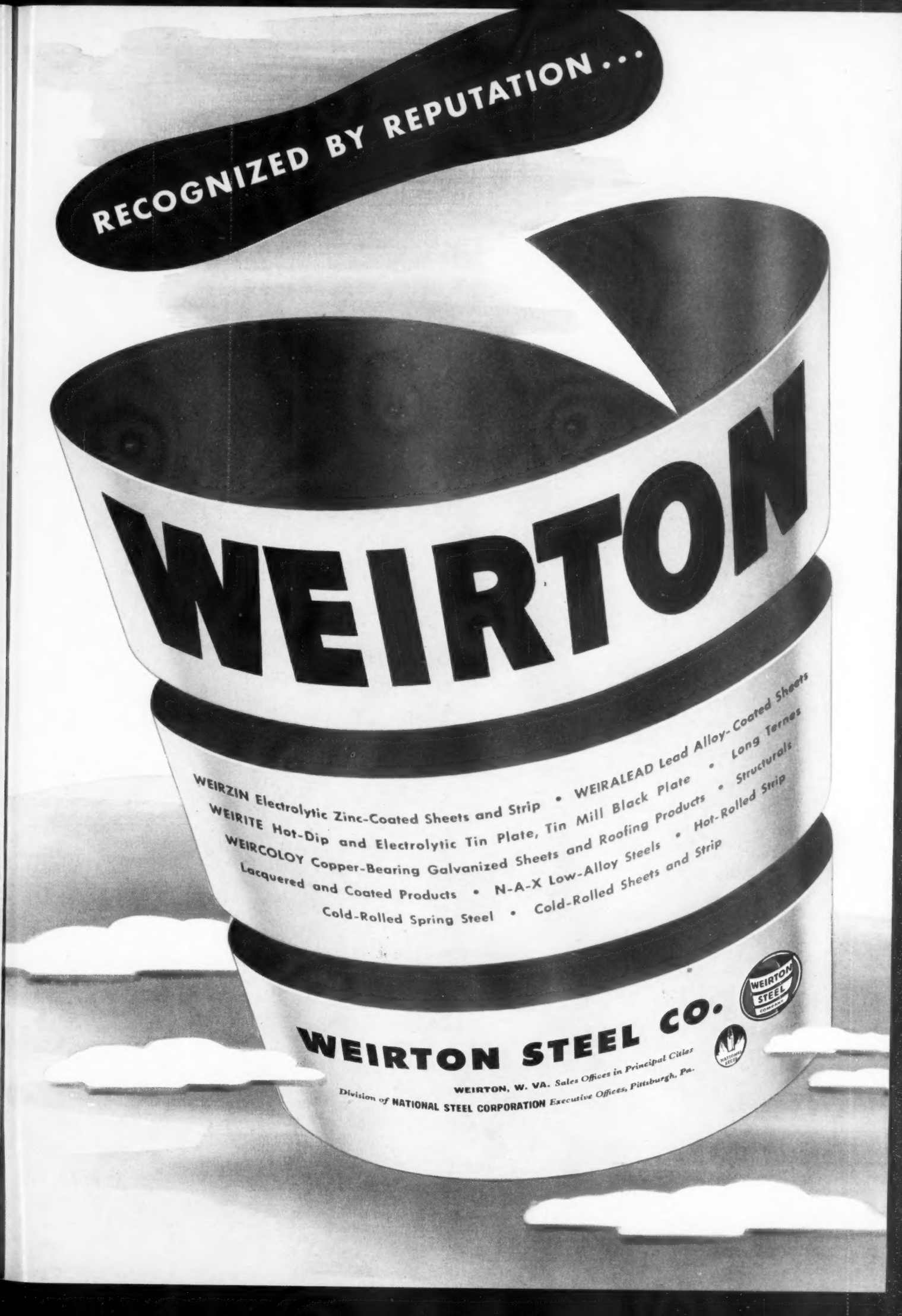
FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONN.

Plants: Ansonia and Derby, Conn., Buffalo, N. Y.

Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Chicago, Los Angeles, Tulsa, Houston

Farrel-Birmingham

FB-404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ARE YOU CHAINED TO THE TRACKS?

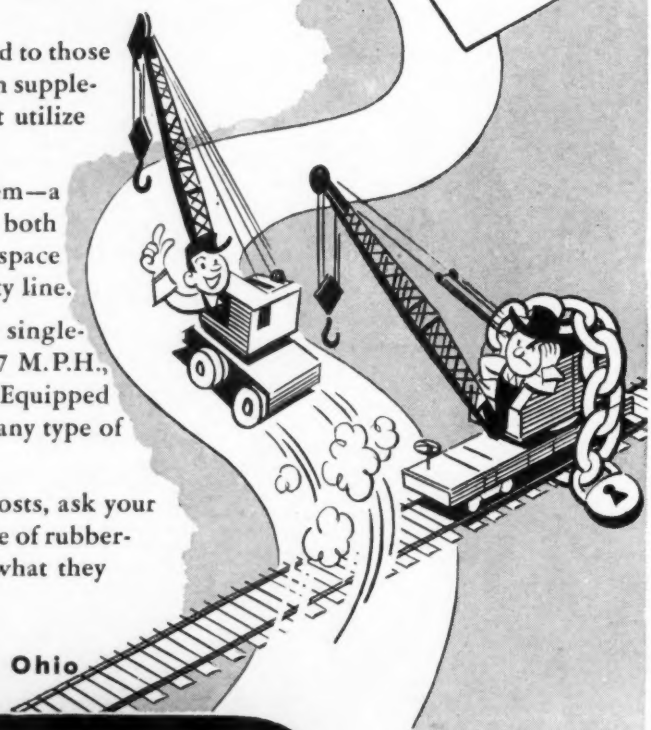
● That's what it amounts to if your yard storage is restricted to those areas served by "track bound" crane equipment. Even when supplemented by other types of fixed equip ient you still can't utilize fully all available storage area.

Pictured above is the practical solution to the problem—a Lorain Self-Propelled Crane. Here the storage area was both fixed and limited. But, with the addition of a Lorain, this space has been extended and now the only limits are the property line.

Mounted on a 4 or 6 wheel rubber-tire carrier, this single-engine, one-man operated unit, traveling at speeds up to 7 M.P.H., can unload and store materials at any point in your yard. Equipped with any one of 15 different crane attachments there isn't any type of material handling job a Lorain can't perform.

If storage bottlenecks are adding to your production costs, ask your local Thew-Lorain distributor for data on this complete line of rubber-tire and crawler mounted Lorains. He has the facts on what they have done for others and can do for you.

THE THEW SHOVEL COMPANY • Lorain, Ohio



thew-Lorain®

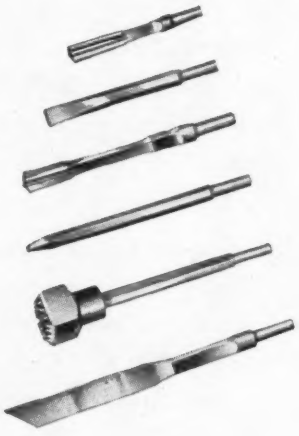
LORAIN CRANE HANDLING *VS* MAN HANDLING *SAVES MONEY*

CRANES • SHOVELS • DRAGLINES • MOTO-CRANES

CHIP, CUT, DRILL, GOUGE

with Thor **PORTABLE ELECTRIC HAMMERS**

Thor U-100 Hammer with the "Sling Shot Drive"



Thor offers a full selection of hammer tools for working with wood, brick, stone, metal composition and other materials.

1600 power-packed blows per minute with Thor Hammers save time and money on hundreds of construction, maintenance and repair jobs. Use them in working stone, concrete, wood, metal and other materials—drilling, channeling, cutting, gouging, chipping, scaling, etc. *Thor's famous "Sling Shot Drive" puts more wallop into every blow.* YOU PROFIT BY LOWER JOB COSTS. Let a demonstration show how. *Your nearby Thor distributor will gladly arrange one at your convenience.*

INDEPENDENT PNEUMATIC TOOL COMPANY

600 W. Jackson Blvd., Chicago 6, Illinois

Birmingham Boston Buffalo Cincinnati Cleveland Denver Detroit
Houston Los Angeles Milwaukee New York Philadelphia Pittsburgh
St. Louis St. Paul Salt Lake City San Francisco Toronto, Canada London, England

Thor **PORTABLE POWER TOOLS**

PNEUMATIC TOOLS • UNIVERSAL AND HIGH FREQUENCY ELECTRIC TOOLS • MINING AND CONTRACTORS TOOLS

Put it on the Blanchard

Machining a flat surface on lifting brackets

PRODUCTION RATE IS $5\frac{15}{17}$ TO ONE . . .

The very high rate at which a Blanchard removes metal makes it a logical, profitable choice for producing flat surfaces directly from the rough casting. In addition Blanchard Grinders usually provide operation saving, fixture saving, operational ease, safety and give greater flatness with improved surface finish.

Often these add up to amazing savings in time, increased production, and reduced cost-per-piece, as in the case of the above-illustrated cast iron lifting brackets. The *rough* castings—10" x 3¾" x 2½"—are blocked on the 16" diameter magnetic chuck of a No. 11 Blanchard Surface Grinder. One-eighth inch of stock is removed from one surface to produce desired tolerance.

THE PRODUCTION RATE ON THE BLANCHARD IS 17 TIME UNITS PER PIECE AS COMPARED TO 100 TIME UNITS WHEN MACHINED BY THE FORMER METHOD.

It will in no way obligate you to find out what Blanchard Grinding can do in producing flat surfaces on your products. You (or your representative) may see the grinding of samples of your own work at our plant. Your only expense will be for transportation.

Send for your free copy of "Work Done on the Blanchard", third edition. This new book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

BLANCHARD

The BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.

ONE train comprising fifteen locomotives and sixty coal hopper cars of a single railroad was recently shipped by us as scrap.

These locomotives and cars embark on their final run as obsolete equipment . . . they will be converted by steel mills and may emerge as streamlined locomotives or other needed equipment.

Speed Scrap Collection — get equipment sooner!

FOR THE SALE OR PURCHASE OF SCRAP — CONSULT OUR NEAREST OFFICE

LURIA BROTHERS & COMPANY, INC.

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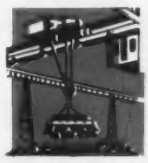

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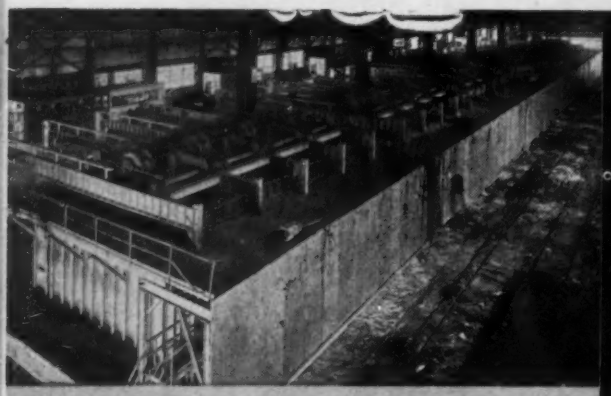
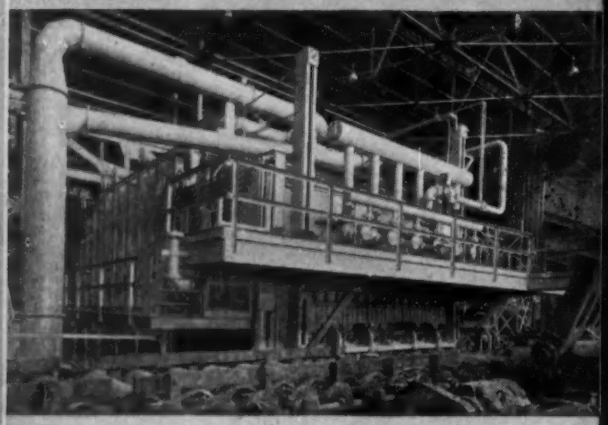
Boston, Mass.–Statler Bldg. • **Cleveland, O.**–2201 Terminal Tower • **Houston, Texas**–Cotton Exchange Bldg. • **Lebanon, Pa.**–Luria Bldg. • **Chicago, Ill.**–100 W. Monroe St. • **Reading, Pa.**–Luria Bldg. • **New York, N. Y.**–Woolworth Bldg. • **Pittsburgh, Pa.**–Oliver Bldg. • **Detroit, Mich.**–2011 Book Bldg. **Pueblo, Colo.**–P. O. Box #1596 • **St. Louis, Mo.**–2110 Railway Exchange Bldg. • **Birmingham, Ala.**–Empire Bldg. • **Buffalo, N. Y.**–Genesee Bldg.

LEADERS IN IRON AND STEEL SCRAP SINCE 1889

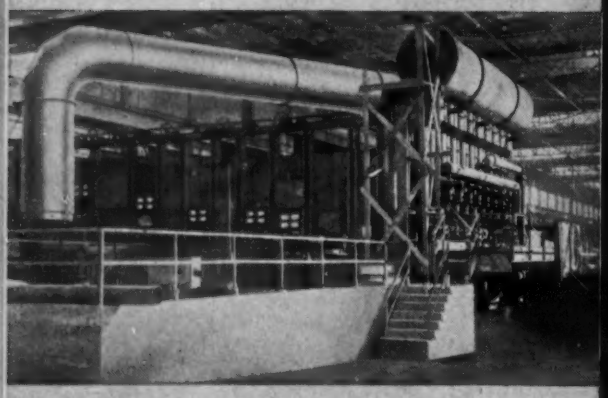
'SURFACE' SERVES WITH HEAT



"Surface" one-way fired soaking pits



"Surface" slab heating furnace



"Surface" billet reheating furnace

"Surface" continuous heat treating furnaces for plate

FROM INGOT TO FINISHED PRODUCT

Hundreds of installations, including the modern One-Way Fired Soaking Pits... Slab, Billet and Round Heaters ...Continuous and Batch Normalizers and Annealers — Muffle-type and Radiant Tube Fired, Controlled Atmosphere Furnaces... give outstanding proof of "Surface" acceptance wherever heat is used in the Steel Industry.

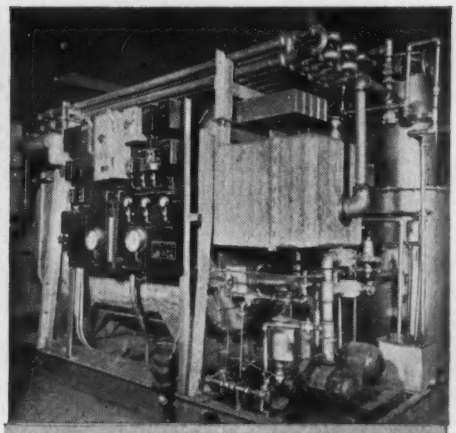
"Surface" collaboration with metallurgists and engineers in the metal producing and working industries, plus the years of constant laboratory research in the scientific application of gases, heat and mechanisms to the many heating problems, have resulted in continuous improvement in equipment to give the desired result. Only a few such installations are shown herewith, representative of "Surface" developments in the industry.

Now, when quality tonnage is paramount, "Surface" is ready with modern processes and methods to meet the world's demands.

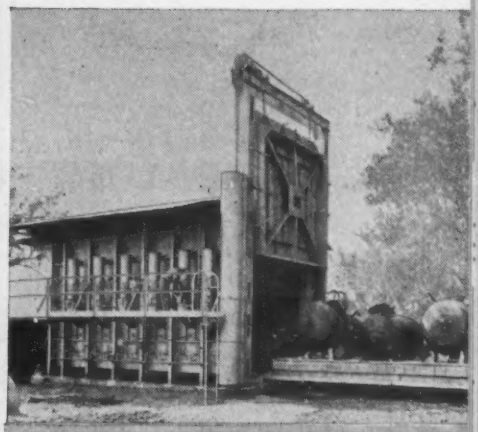
'Surface'

SURFACE COMBUSTION • TOLEDO 1, OHIO

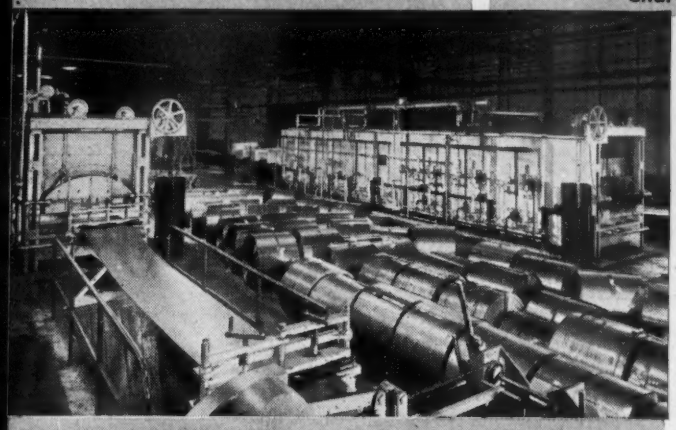
"Surface" rod annealing in pit type convection furnaces



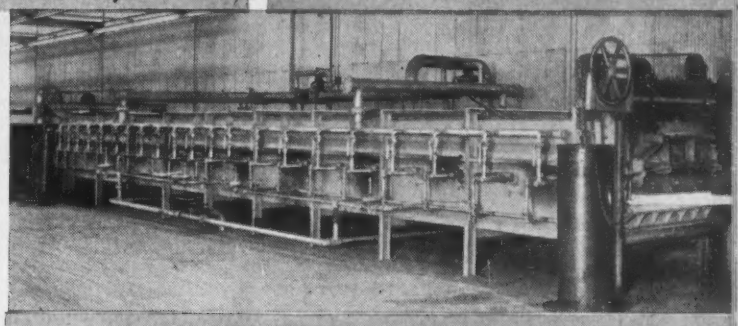
"Surface" prepared gas generating equipment (NX, RX, DX and Char-Mo Gases).



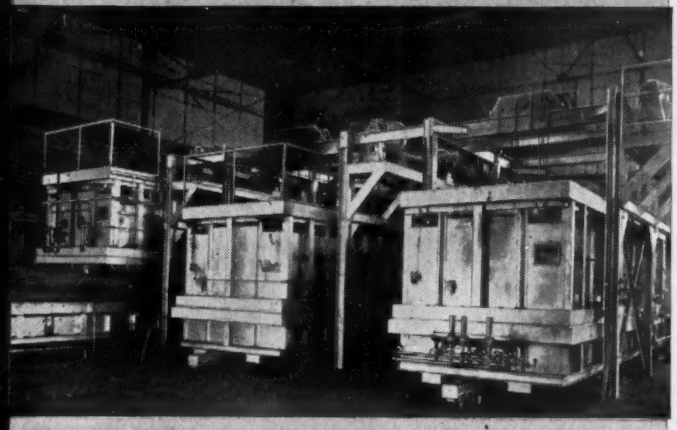
"Surface" stress relief furnace



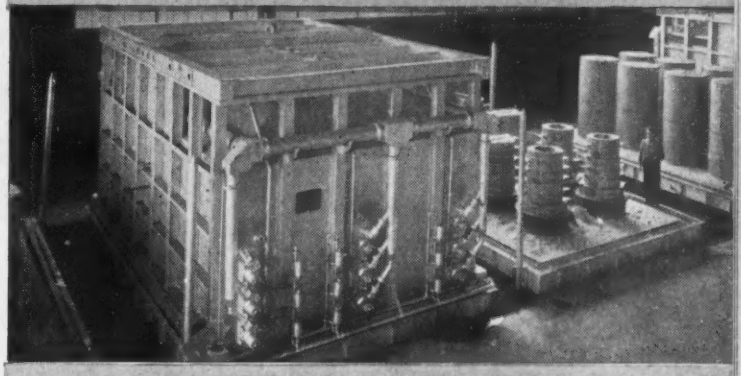
"Surface" continuous controlled atmosphere strip annealing and normalizing furnaces



"Surface" wire patenting furnace

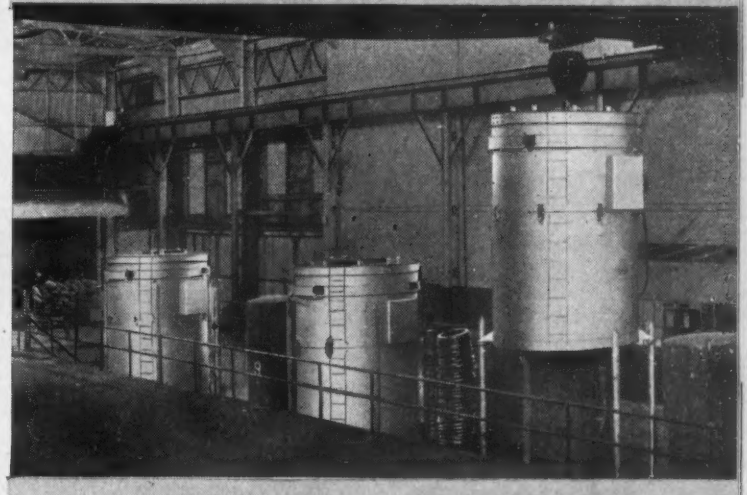


"Surface" high alloy rod and bar atmosphere annealing lift-cover with car-bottom furnace



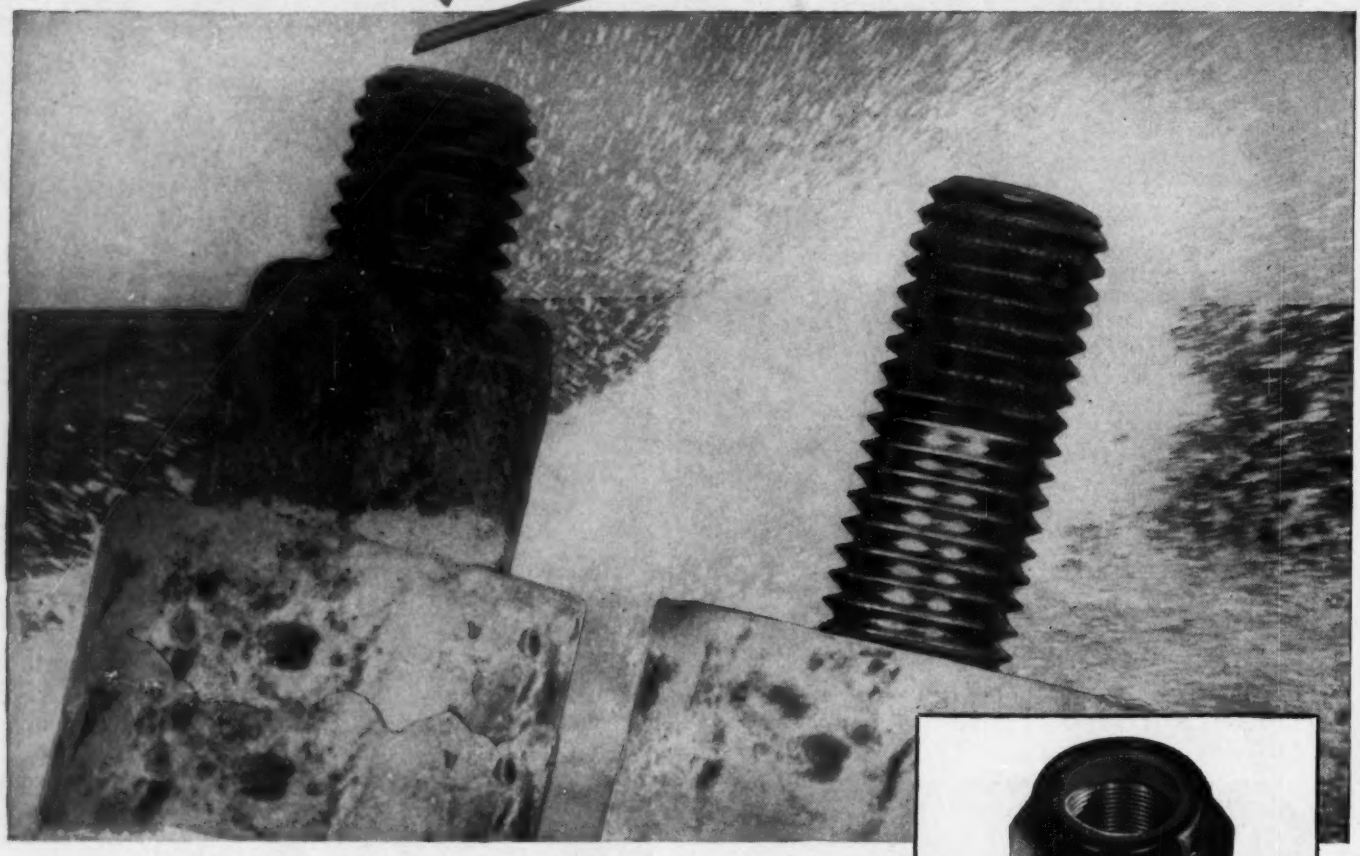
"Surface" controlled atmosphere coil and sheet annealing covers

"Surface" bright annealing and normalizing furnace for tubing



"Surface" controlled atmosphere wire and rod annealing furnaces

SELF-SEALING TO *Prevent Corrosion* OF BOLT THREADS



—with the Red Elastic Collar that protects the threads against Liquid Seepage

Moisture cannot penetrate the Red Elastic Collar. Study the heavily corroded bolt and nut assembly in the unretouched test photograph. It has been subjected to the equivalent of three years' exposure to moisture . . . to industrial smoke and grime . . . to climatic change. Study the same bolt with the nut removed. Look at the bolt threads that were inside the Elastic Stop Nut. They're as good as new! Why? Because the Red Elastic Collar protects them permanently against Liquid Seepage—and Corrosion. Elastic Stop Nuts are easily removed because they cannot 'rust solid'. They prevent fasteners from failing because of corrosion weakened threads.

Here's a challenge: Send us complete details of your toughest bolted trouble spot. We'll supply test nuts—FREE, in experimental quantities. For further information or literature address: Elastic Stop Nut Corporation of America, Union, New Jersey. Representatives and Agents are located in many principal cities.

The RED ELASTIC COLLAR

—denoting an ESNA product—

. . . is threadless and permanently elastic. Every bolt—*regardless of commercial tolerances*—impresses (does not cut) its full thread contact in the Red Elastic Collar. This threading action produces a compressive, radial-reactive pressure against *both* the top and bottom sides of the bolt threads . . . insures a permanently tight, full contact between the bolt and nut threads . . . and makes all Elastic Stop Nuts self-sealing against Liquid Seepage.

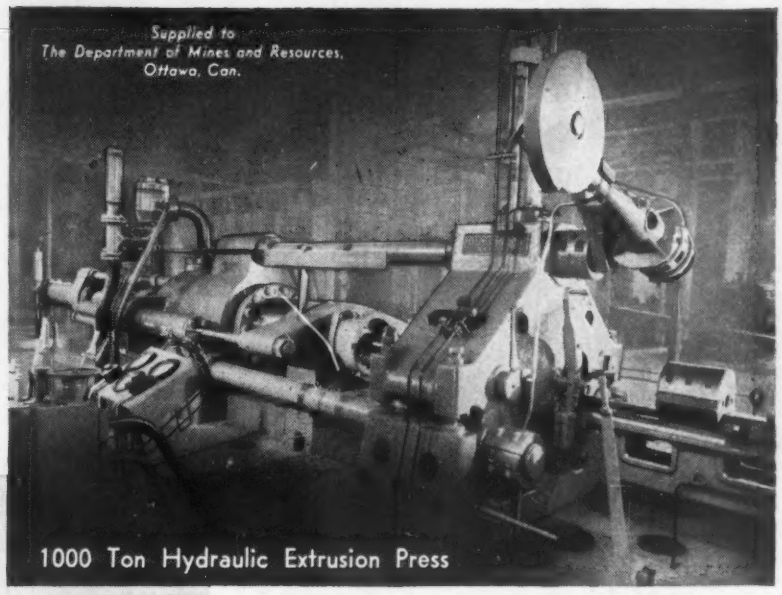
As a result, all Elastic Stop Nuts protect permanently against thread corrosion.

ELASTIC STOP NUTS

PRODUCTS OF: ELASTIC STOP NUT CORPORATION OF AMERICA

HYDRAULIC MACHINERY AND ROLLING MILLS

FOR RESEARCH AND LABORATORY



Supplied to
The Department of Mines and Resources,
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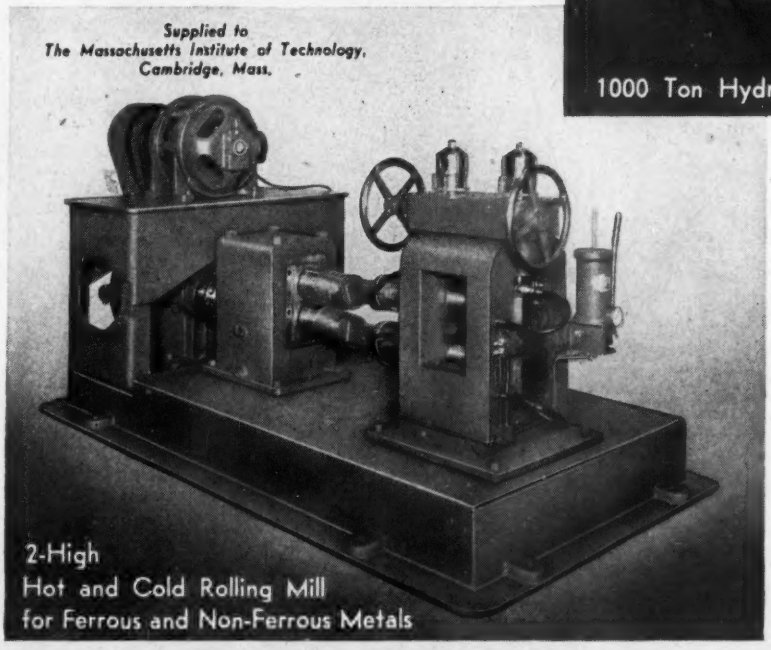
1000 Ton Hydraulic Extrusion Press



Supplied to
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2-High
Hot and Cold Rolling Mill
for Ferrous and Non-Ferrous Metals

WE BUILD

HYDRAULIC PRESSES

for Iron and Steel Works, Tube Mills, Ship Building, Locomotive and Boiler Shops

ROLLING MILLS AND ROLLING MILL EQUIPMENT

for Steel, Ferrous and Non-Ferrous Metals such as Aluminum, Magnesium, Lead, Zinc, Nickel, Brass, Bronze, etc.

HYDROPRESS · INC.

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HYDRAULIC PRESSES · ROLLING MILLS · PUMPS
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566 LEXINGTON AVENUE · NEW YORK 22 · N. Y.

DETROIT SAN FRANCISCO SEATTLE WASHINGTON, D. C.

They got a HEAD Start !

Each product pictured here incorporates a Lukens head —its designer had that shape in mind as he developed the rest of the product. As a result, the fabricator starts with a semi-finished product. Manufacturing time and costs are reduced.

Heads are *plate* products, spun or pressed. The metal is sound, uniform in structure and dependable. Parts can be made lighter in weight. Products perform better and last longer.

Designers often find that standard heads, already in Lukens stock or made from existing dies, meet their requirements. Where special shapes are required, we're well equipped to supply nonstandard or intermediate sizes.

Our engineers welcome the opportunity to help designers "get a head start" with Lukens heads. For this help, or the 132-page Lukens manual "Flanging-Pressing" containing essential data on 3,868 heads, write today on your letterhead. Lukens Steel Company, 414 Lukens Building, Coatesville, Pennsylvania.

LUKENS

HEADS

★

FOUR INCHES TO OVER EIGHTEEN FEET IN DIAMETER

urning the tables

ON THE TREND OF CLEANING COSTS

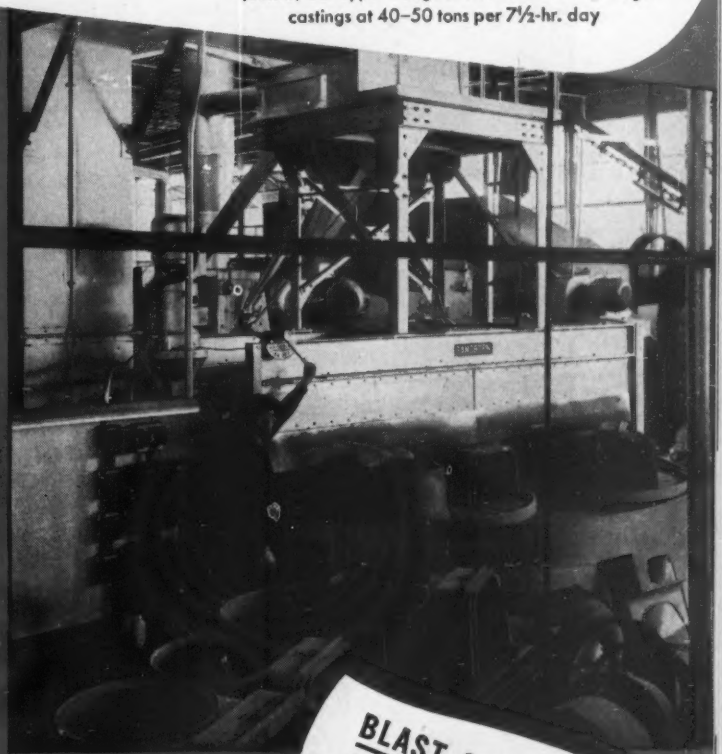
Budd Wheel, Detroit, uses 10 Pangborn Type LG (shown above) ROTOBLAST Tables for blast cleaning brake drums

44-lb. pump housings (very dirty coming from the shake-out) cleaned at the rate of one ton per hour . . . master connecting rods cleaned at better than double the rate of barrel-cleaning . . . castings for stoves cleaned at the rate of over 5000 lbs. an hour (more than could be handled by 23 tumbling mills) . . . those cost-cutting production rates are being obtained with the modern Pangborn ROTOBLAST* Cleaning Table. In every case, too — quality of finish was improved!

This versatile machine, which uses metal abrasive and centrifugal force to do the cleaning, takes the work as it comes — no waiting for batches of similar character. All exposed surfaces are offered directly to the abrasive stream — merely turning the work over for a second pass accomplishes the complete job. Loading and unloading are done while the table is moving and cleaning is in process.

*Trademark of the Pangborn Corporation

(Below) LG Type Pangborn Table cleaning large castings at 40–50 tons per 7½-hr. day



A modern ROTOBLAST Table does the work of 2½ to 3 airblast tables of comparable size!

Then add further advantages: Ability to handle fragile work or the general run of jobbing work. None of the breakages experienced with tumbling. Variable cleaning speeds. Work brought before operator's eyes — for inspection. Uniformly high quality of finish.

For new Bulletin No. 215, write Pangborn, *world's largest manufacturer of blast cleaning and dust control equipment*. Pangborn Corporation, 1298 Pangborn Boulevard, Hagerstown, Maryland.

Pangborn

PANGBORN CORPORATION, HAGERSTOWN, MARYLAND

BLAST CLEANS CHEAPER WITH THE RIGHT EQUIPMENT FOR EVERY JOB

FOURTEEN TYPES

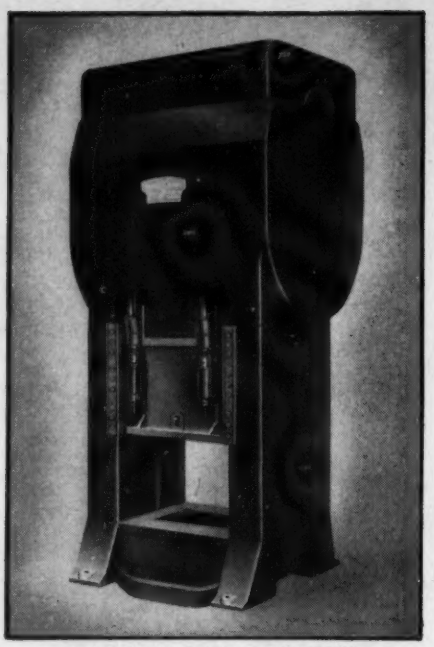
INCLINABLE • HORNING • PUNCH TYPE

PUNCH TYPE HORNING • GAP • KNUCKLE JOINT

TRIMMING • FORGING-SIZING • TOGGLE

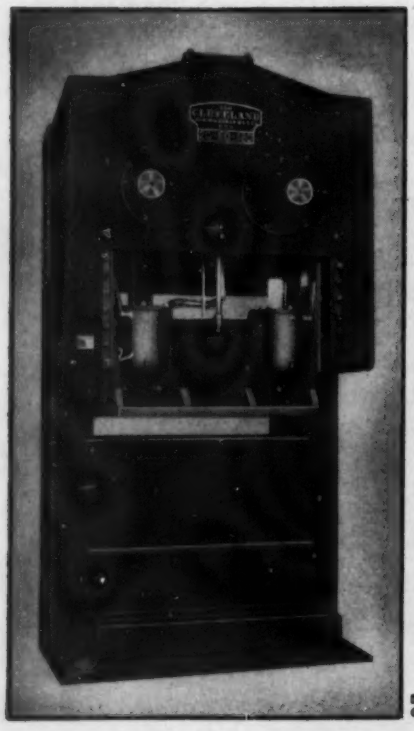
STRAIGHT SIDED CRANK • STRAIGHT SIDED ECCENTRIC

SINGLE POINT • TWO POINT • FOUR POINT



SINGLE CRANK, DOUBLE ACTION TOGGLE.

CLEVELAND PRESSES

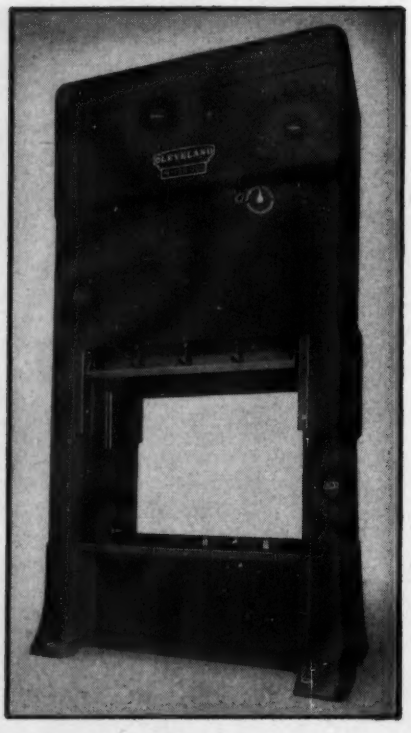


DOUBLE CRANK, OPEN BACK, GAP

Because no single type of Power Press is suitable for the economical production of all pressed metal products, Cleveland offers manufacturers who are seeking higher manufacturing efficiency with lower operating costs, a complete range of fourteen types of Presses, in sizes and capacities to meet particular requirements.

Therefore, when you consult Cleveland Engineers about your Power Press problems you have every assurance that their recommendations are not restricted by limitations of either types or sizes but are based solely on the most suitable type and size for the work you wish to perform.

Furthermore, all Cleveland Presses embody every modern feature for long life, dependability, ease of operation, accuracy and profitable production.

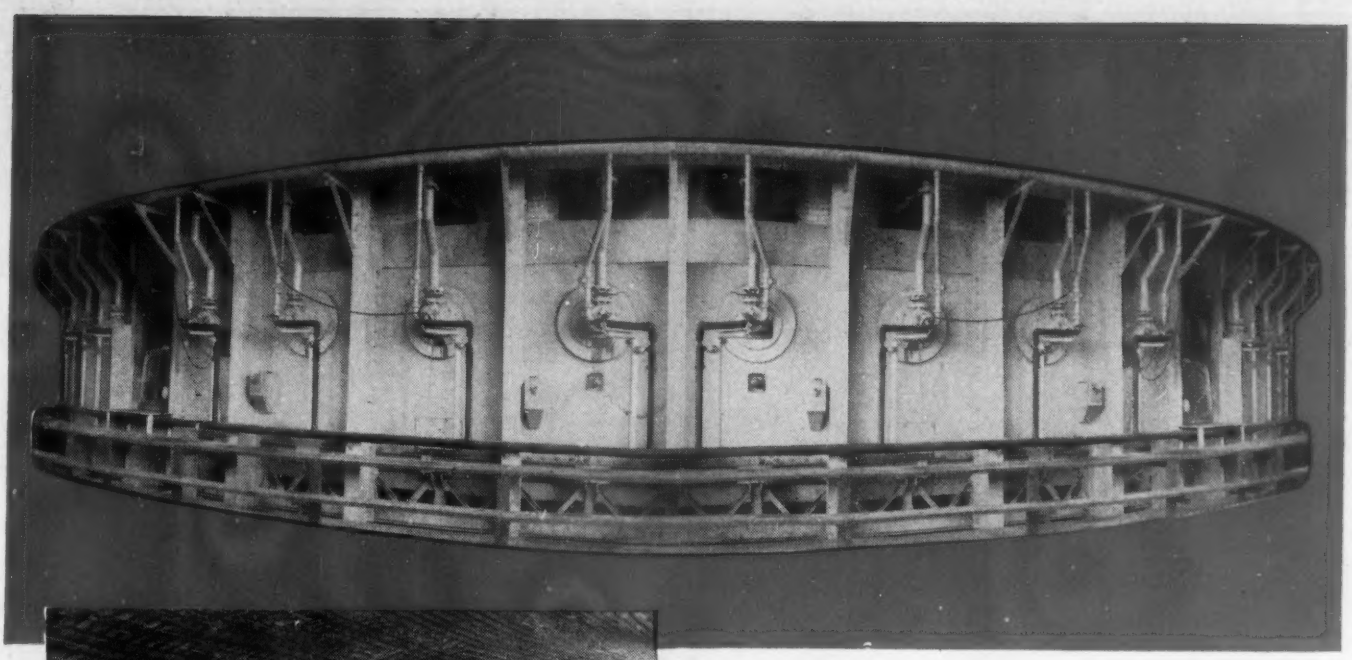


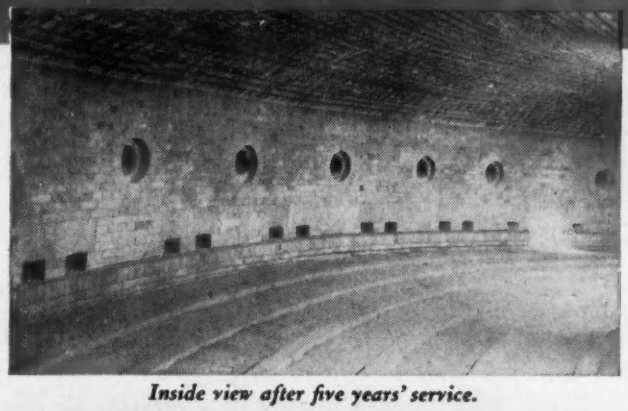
MODERN FOUR POINT PRESS

CLEVELAND

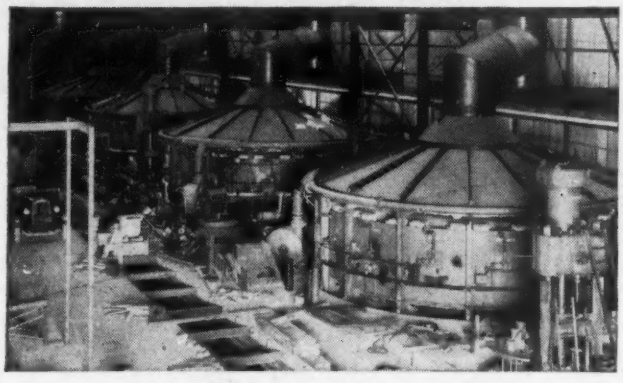
THE CLEVELAND PUNCH & SHEAR WORKS CO. • CLEVELAND 14, OHIO

NEW YORK • CHICAGO • DETROIT • PHILADELPHIA • PITTSBURGH





Inside view after five years' service.



SALEM ROTARY FURNACES ARE POPULAR

Good Planning and Engineering result in patented features which combine increased production with easy and low cost maintenance

The seal between the rotating hearth and the stationary walls can be easily lowered in short sections to provide quick and complete accessibility.

This type seal is another of Salem's many patented features, carefully developed to improve equipment.

SALEM ENGINEERING CO. · SALEM, OHIO
SOUTHWEST OFFICE · FORT WORTH, TEXAS
SALEM ENGINEERING CO. (Canada) Ltd., TORONTO
SALEM ENGINEERING CO. • SHEFFIELD, ENGLAND

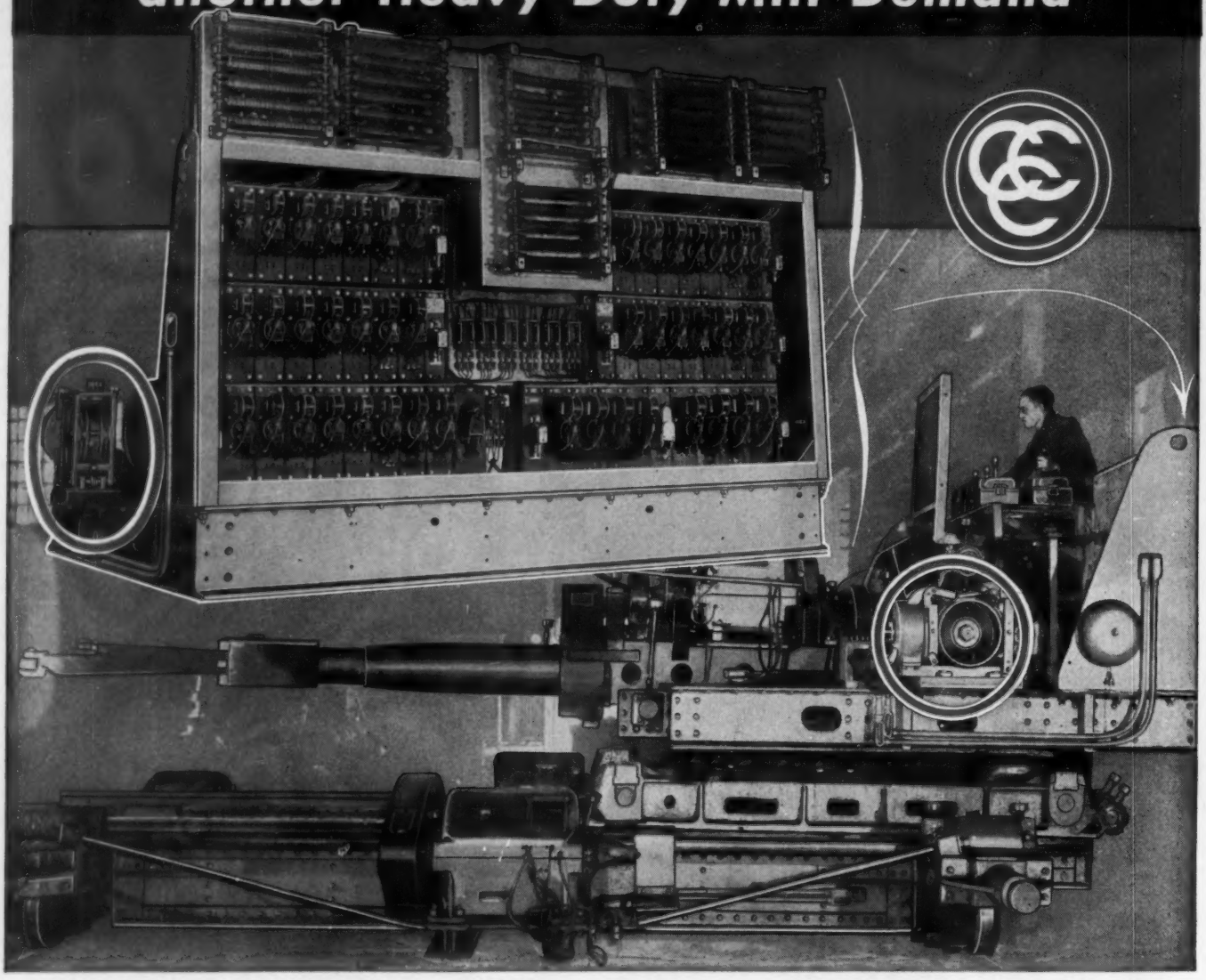
SALEM

ALL OFFICES STAFFED FOR . ENGINEERING, CONSTRUCTION and OPERATION

Salem Builds

CIRCULAR SOAKING PITS
ROTARY HEARTH FURNACES
CONTINUOUS BUTT-WELD FURNACES
CAR BOTTOM FURNACES
FORGE FURNACES
HEAT TREATING FURNACES
NEEDLE METALLIC RECUPERATORS
AIR RECIRCULATING FURNACES
GAS ATMOSPHERE FURNACES
MECHANICAL EQUIPMENT FOR CHARGING AND DISCHARGING MATERIAL FROM FURNACES

CLARK CONTROL *and* BRAKES *fill another Heavy-Duty Mill Demand*



All operations of this Floor-Type Wheel Charger are magnetically controlled by CLARK Heavy-Duty mill apparatus. Previous to this CLARK magnetic control installation, all operations were manually controlled—a laborious task with plenty of maintenance needed.

CLARK Magnetic Control, using Bulletin 7400 Varitime Contactors, which have a built-in adjustable time-delay feature, definitely eases the starting load on motors, thus reducing maintenance.

The CLARK magnetic control panel, complete with Bulletin 110 Edgewound Resistors, is built into that section of the Charger directly back of the operator. Removal of metal doors makes the control panel easily accessible for inspection and maintenance.

CLARK Bulletin 106 Shoe Brakes (circled in red) provide rapid, smooth, braking action with no severe shock to the connected mechanism.

Only ONE maintenance adjustment—for brake-lining wear—is necessary. DURING OPERATION or WHEN THE BRAKE IS IDLE, you see at a glance when lining wear makes adjustment necessary. You just look at the TOP of the Brake—not at the bottom—not at the sides—not at the ends—but on TOP—where the entire adjustment is made—where you can see what you're doing, and can get at it easily.

Our nearest District Office or Agency will gladly cooperate with you on Mill Control problems.

EVERYTHING UNDER CONTROL

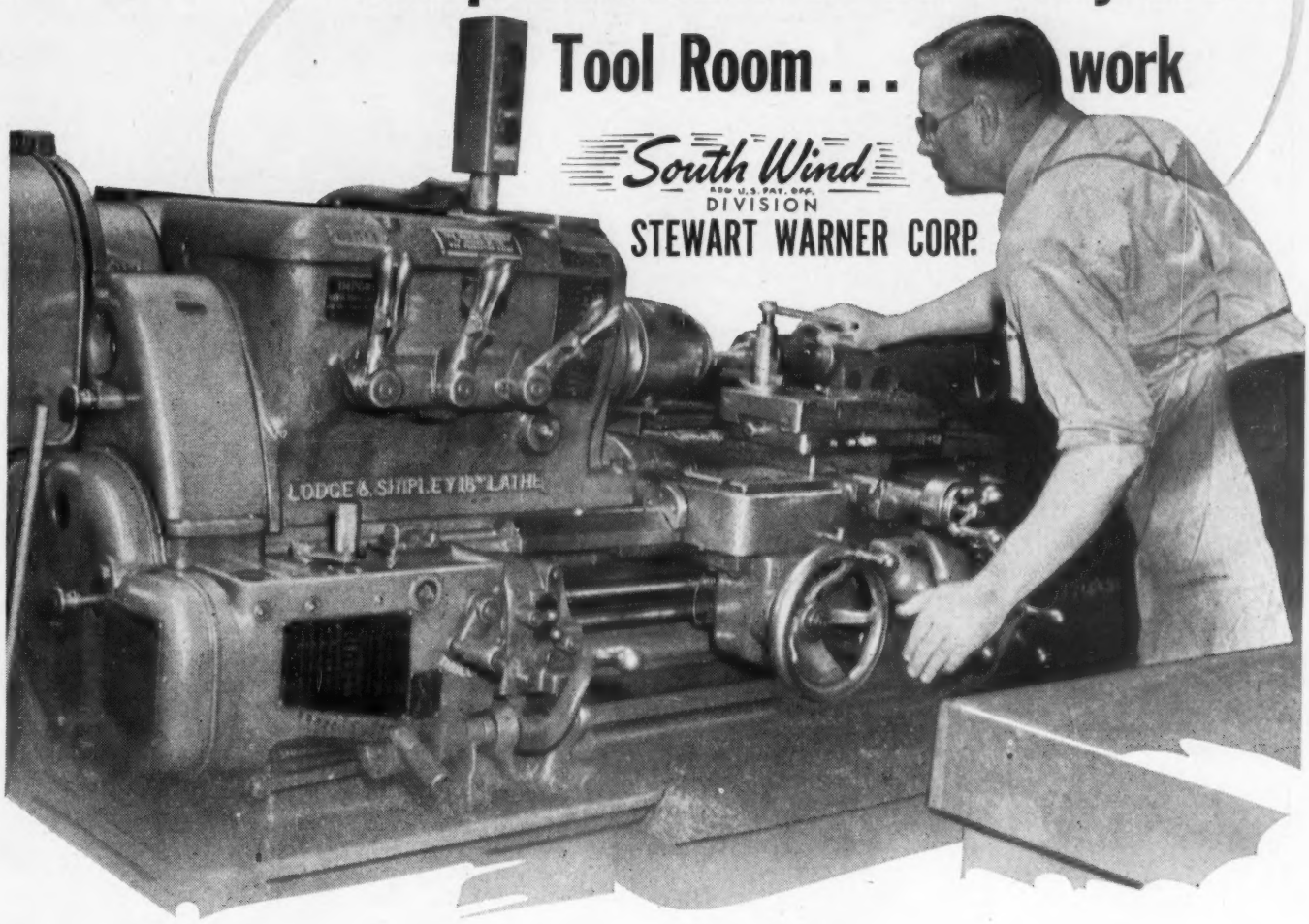
THE CLARK CONTROLLER CO.

1146 EAST 152nd STREET, CLEVELAND 10, OHIO

LODGE & SHIPLEY LATHES at work

Guarantee the precision . . . and performance so necessary in . . . Tool Room . . . work

South Wind
REG. U.S. PAT. OFF.
DIVISION
STEWART WARNER CORP.



● In the illustration, a die punch to be used in the production of famous "South Wind" gasoline-burning auto heaters is being machined on a 16″ Lodge & Shipley Tool-Room Lathe. This and other precision operations cause the owner to comment: "the foreman, as well as the operators, consider the Lodge & Shipley Lathe an excellent piece of equipment."

Forming tools, punches, screws and other precision parts are produced on Lodge & Shipley lathes in the South Wind plant. Operations including turning, boring, facing and threading are performed with carbide and high speed steel tools . . . hair-line finishing cuts can be made with extreme accuracy.

The chances are one of your industrial neighbors is an enthusiastic Lodge & Shipley user. Let our representative show you these fine lathes in action. Write for Condensed Catalog showing the complete line.

THE WORLD KNOWS · L & S LATHES · FOR GOOD LATHES ONLY

THE **Lodge & Shipley** COMPANY

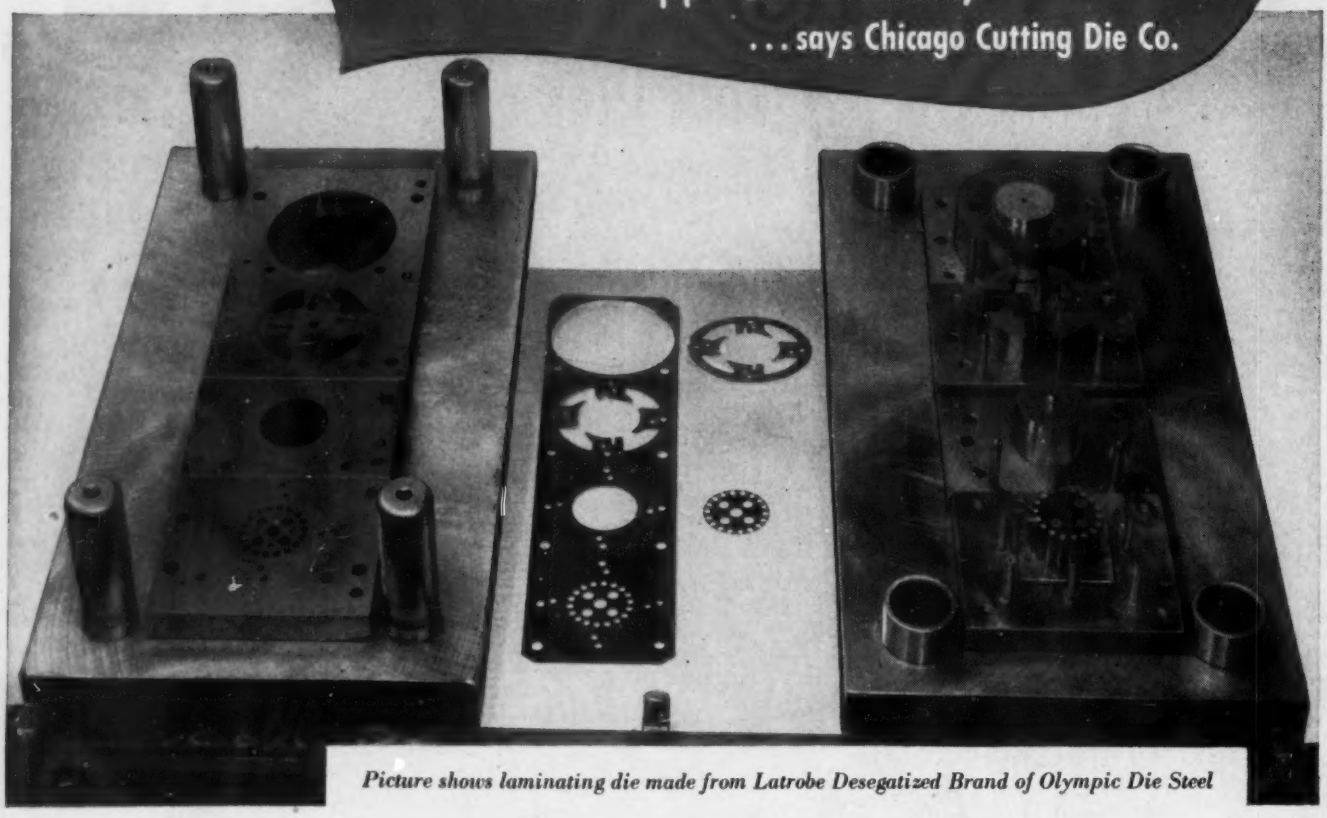
CINCINNATI 25, OHIO

MACHINE TOOL DIVISION • 3055 COLERAIN

SPECIAL PRODUCTS DIVISION • 800 EVANS ST.

No change in shape or size after hardening—
No honing or lapping necessary

... says Chicago Cutting Die Co.



Picture shows laminating die made from Latrobe Desegatized Brand of Olympic Die Steel

Another instance of the advantages provided by

LATROBE
DESEGATIZED
BRAND OF
Dispersed-Segregate STEELS

In the making of a lamination die, such as pictured above, the job is an exceedingly intricate one. Non-deforming characteristics are vitally important. For this reason, **CHICAGO CUTTING DIE CO.** selected Latrobe's *Desegatized Brand* of Olympic Die Steel, thus further assuring uniform quality throughout.

Being definitely free from excessive carbide segregations, Latrobe's DESEGATIZED Brand of Dispersed-Segregate Steels are extra tough, and provide a highly desired safeguard against die break-downs and irregularities. *Write for full information.*

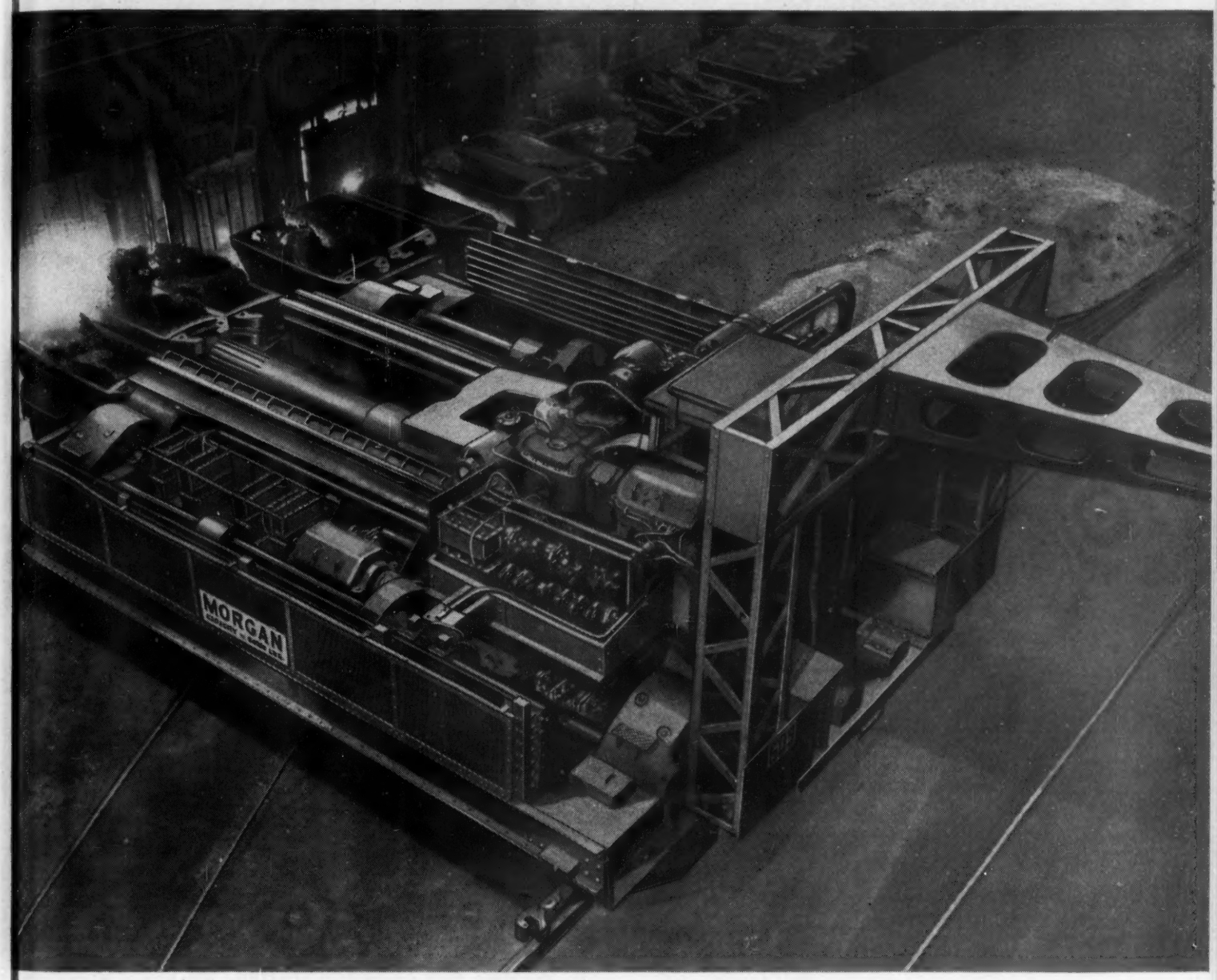
ANALYSIS
Olympic Die Steel
C—1.50
Cr—11.50
V—1.00
Mo—.75

6

LATROBE ELECTRIC STEEL COMPANY • LATROBE, PENNSYLVANIA

BUILT BY MORGAN Engineering

MORGAN 12-TON LOW TYPE OPEN HEARTH FLOOR CHARGER



Illustrated is one of three Morgan 12-ton 27'-0" span Box Chargers on this open hearth floor. Trolley frame is a one piece steel casting. Girders are of heavy box section. End carriages are of fabricated welded box construction. Roller bearings are used throughout. Entire machine is of massive construction especially designed for taking heavy thrust loads. Morgan Chargers are built in a wide variety of sizes in both the low and high type to meet varied charging floor requirements.

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The SIDES of a V-BELT are what GRIP the PULLEY

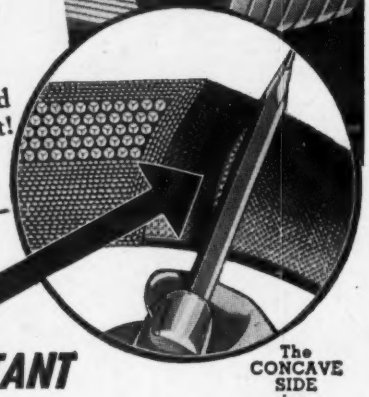
-Naturally, it's the SIDES that GET the WEAR

Diagram of V-Belt in Sheave-Groove

The story of what wears out a V-Belt—and how a belt can be built to withstand this wear a longer time — is quickly told. Here are the facts:—

Only the sides of a V-Belt touch the pulley. The sides do all the gripping on the pulley. The sides pick up the load. They transmit that load to the belt as a whole. Then, once again, the sides grip the driven pulley and deliver the power to it. And the sides take all the wear against the sheave-groove wall.

This explains why everyone who works around machines has always noticed that the *sidewall* of the *ordinary* V-belt is the part that wears out first!



The CONCAVE SIDE is a GATES PATENT

That's Why the *Patented* CONCAVE SIDE That *REDUCES* Wear on Sidewalls is So *IMPORTANT*

Naturally, since the sidewall is the part that wears out first, anything that prolongs the life of the sidewall will lengthen the life of the belt.

The simple diagrams on the right show exactly why the ordinary, straight-sided V-Belt gets excessive wear along the middle of the sides. They show also why the Patented Concave Side greatly reduces sidewall wear in Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longer service than any straight-sided V-Belt can possibly give.

The Concave Side is MORE Important NOW Than Ever Before!

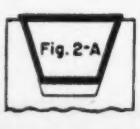
Now that Gates *SPECIALIZED* Research has resulted in Super Vulco Ropes capable of carrying much heavier loads—up to 40% *higher horsepower ratings* in some cases—the sidewall of the belt is called upon to do even more work in transmitting these heavier loads to the pulley. Naturally, with heavier loading on the sidewall, the life-prolonging Concave Side is more important NOW than ever before!

Straight Sided V-Belt — Fig. 1

How Straight Sided V-Belt Bulges When Bending Around Its Pulley — Fig. 1-A

You can actually feel the bulging of a straight-sided V-Belt by holding the sides between your finger and thumb and then bending the belt. Naturally, this bulging produces excessive wear along the middle of the sidewall as indicated by arrows.

Gates V-Belt with Patented Concave Sidewall — Fig. 2



Showing How Concave Side of Gates V-Belt Straightens to Make Perfect Fit in Sheave Groove When Belt Is Bending Over Pulley. — Fig. 2-A

No bulging against the sides of the sheave groove means that sidewall wear is evenly distributed over the full width of the sidewall—and that means much longer life for the belt!

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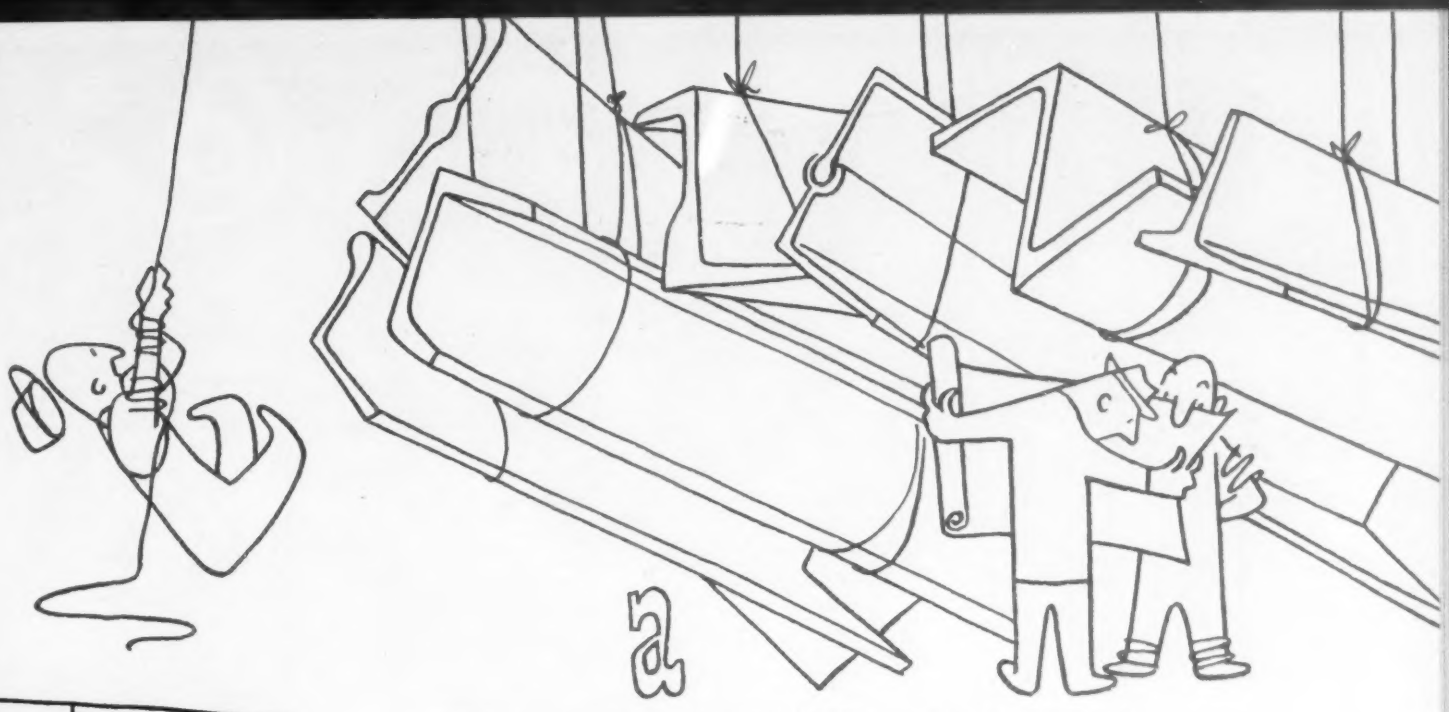
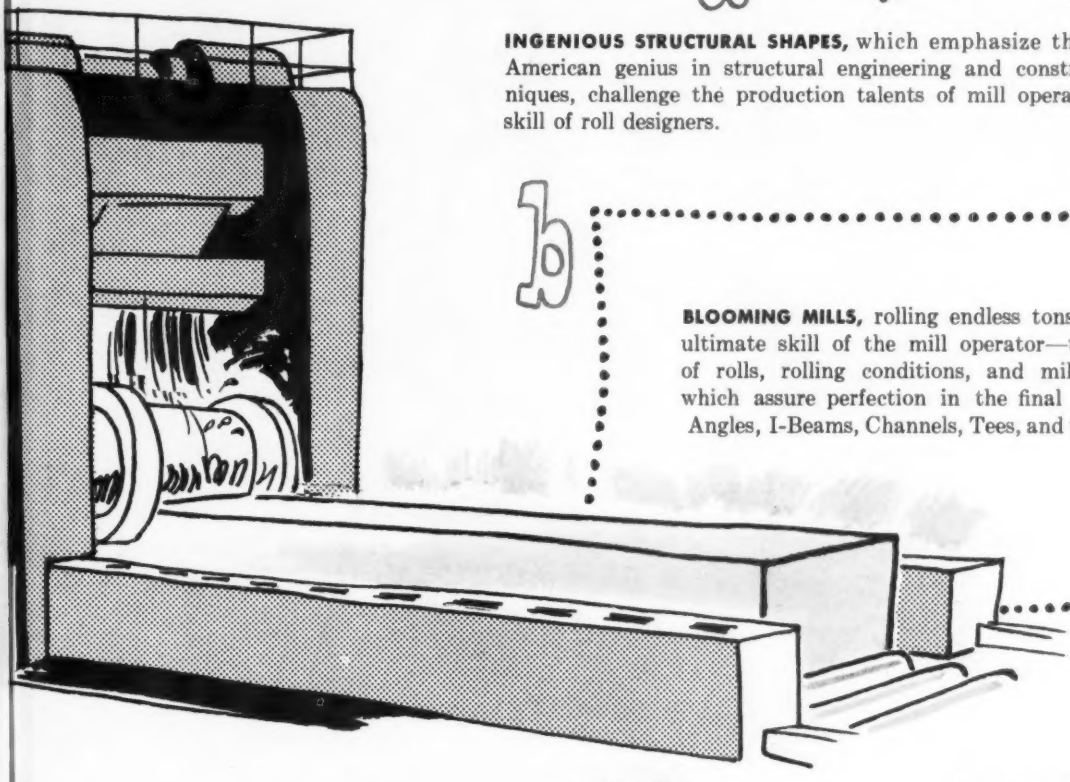


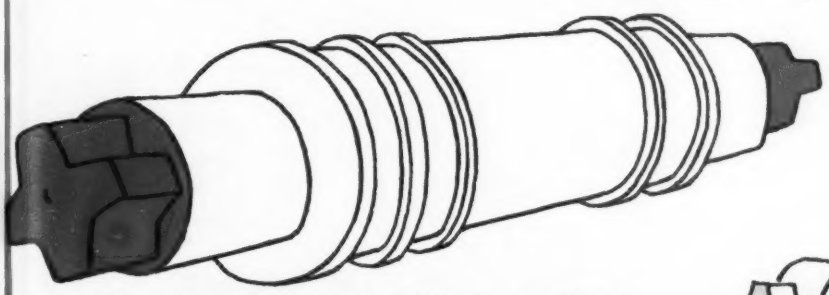
a

INGENIOUS STRUCTURAL SHAPES, which emphasize the peculiarly American genius in structural engineering and construction techniques, challenge the production talents of mill operators and the skill of roll designers.



b

BLOOMING MILLS, rolling endless tons of ingots, demand the ultimate skill of the mill operator—the practical knowledge of rolls, rolling conditions, and mill production standards which assure perfection in the final output of Z-Bars, Bulb Angles, I-Beams, Channels, Tees, and the myriad other shapes.



c

RED WABBLER ROLLS fulfill your exacting demands because your own blooming-mill know-how—the accumulated skill of your years of rolling mill experience—guides Mack-Hemp engineers in the development of rolls which establish production records and set the standards for long roll life.

MACK-HEMP CRAFTSMEN and mill-wise M-H engineers continue to combine their skills to supplement your knowledge in the design, metallurgy and manufacture of Red Wabbler Rolls—the proper rolls for your production rolling operations.

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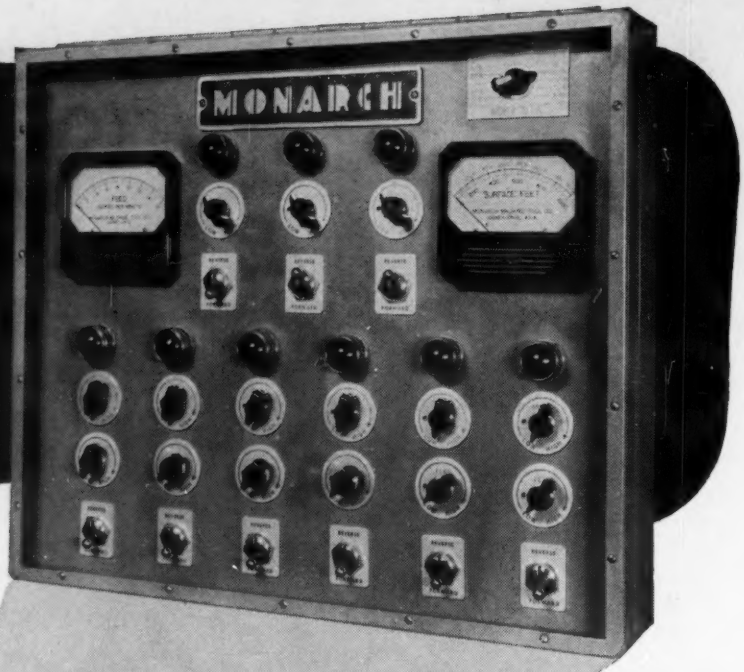
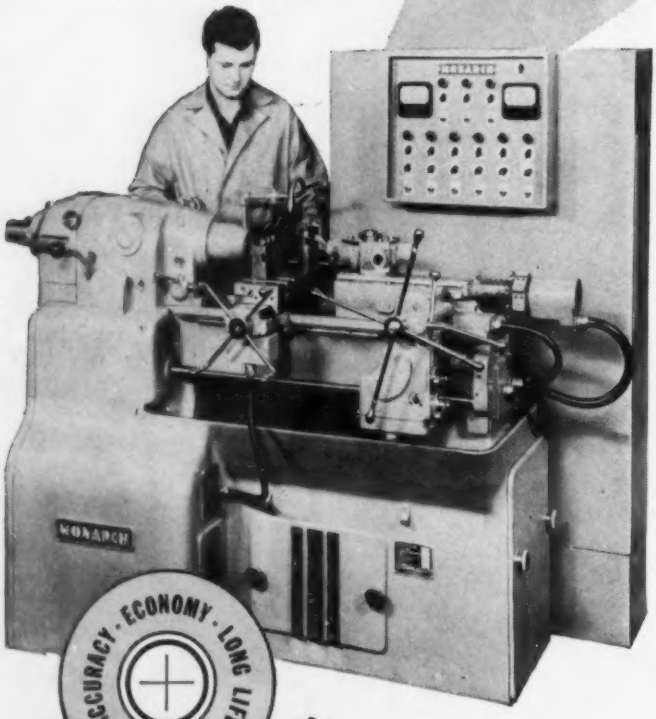


You can pre-select any 9 spindle speeds—up to 5000 RPM any 6 feeds—from 1/8" to 16" per min. on the MONARCH SPEEDI-MATIC "World's fastest hand screw machine"



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STEEL

The Magazine of Metalworking and Metalproducing

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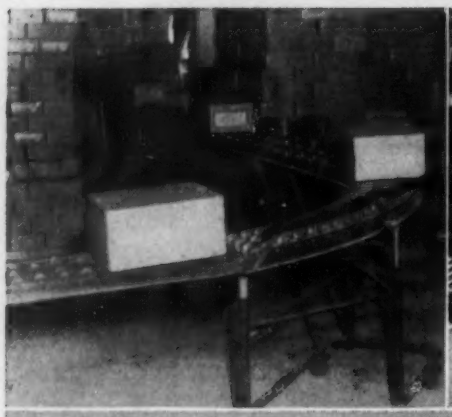

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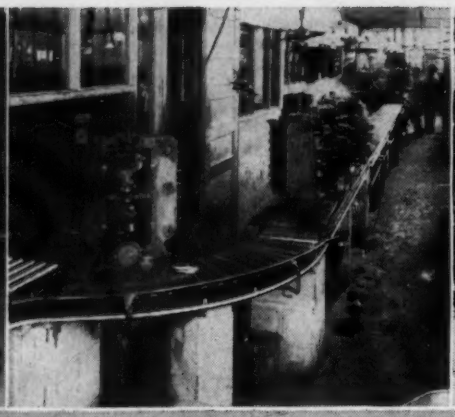

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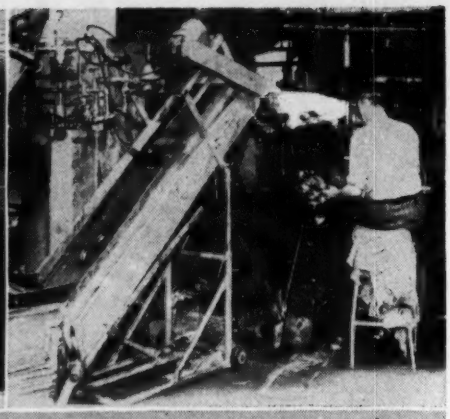

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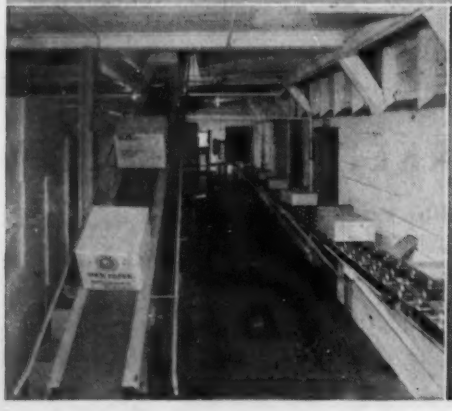
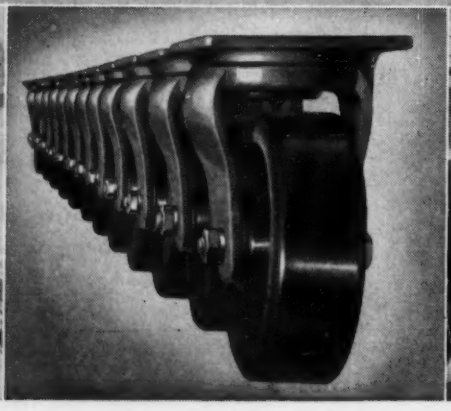




November 3, 1947

Aid for Europe

Congress will meet Nov. 17 to act upon the President's proposal for aid to Europe. Whether or not the real needs of European nations will be known clearly by that time remains to be seen. Meanwhile, we have a fair idea of our ability to aid in the report "National Resources and Foreign Aid," prepared under the direction of Secretary of the Interior J. A. Krug.

The more one studies this report the more one is favorably impressed. It is factual and objective to a degree seldom equaled in similar government studies. If the gremlins who were so successful in introducing sly propaganda into some previous government documents tinkered with the Krug report, their handiwork is not discernible.

Prominently stressed in the text is the fact that substantial foreign aid in the form of certain scarce items such as steel, agricultural implements, freight cars and mining machinery will aggravate already acute domestic shortages. As against this complication the report points out realistically that the American productive system has historic characteristics of great flexibility and adaptability. After carefully weighing these offsetting factors, the report concludes that "our economy in general is physically capable of providing the resource requirements of a considerable program of foreign aid."

The American public and Congress will want to weigh this ability to aid not only against the demonstrable needs abroad but also against the probable over-all results of the aid extended. There will be a natural tendency to guard against extending aid that would be wasteful or would defeat its purpose. On this score it will not be easy to forget the abuses of lend-lease and UNRRA. Nor will it be easy to justify aid if it is to be administered by some unstable governments abroad.

The ideal method would be to channel as much aid as possible into private hands. The greatest recovery in Europe is in countries where private initiative enjoys the greatest freedom. The most dismal failures to recover are in the countries where the governments dominate everything. To extend aid to governments which would kill private initiative would defeat our purpose.

The more our aid can be directed through private dealing, the more effective it will be.

* * *

BEST FOOT FORWARD: G. Edward Pendray, guest speaker at the semiannual meeting of the American Gear Manufacturers Association in Chicago, emphasized the importance of interpreting modern industry and modern economics to employees and to the "man in the street." He showed how many orthodox financial reports—particularly of large corporations—serve to perpetuate the myth that management and stockholders receive exorbitant profits at the expense of wage earners.

This criticism of the inadequacy of financial statements, which has been mounting rapidly since V-J Day, is justified. While an increasing number of alert corporations are improving their annual reports from year to year, far too many continue to issue dull statements which lend themselves to easy exploitation by anti-business critics.

The remedy for this situation rests with the executive heads of America's industrial corporations. All they have to do to get results is to declare positively that "selling" the truth about the company's policies to employees and the

(OVER)

AS THE EDITOR VIEWS THE NEWS

public is as important as selling the company's product to its customers.

When top management decrees that this type of public relations is important, then the annual statement that records fictitious profits because of unrealistic depreciation allowances, or because of other outmoded accounting practices, will become taboo. Industry still is too reluctant to put its best foot forward. —p. 66

* * *

GO SLOW ON CONTROLS: When Congress convenes Nov. 17 to tackle foreign aid and inflation, steel will figure prominently in the discussion because it is a key factor in both problems. Apparently the President and his advisers are dead-set against re-establishing an elaborate controls system. They are considering limited controls, which would allocate steel ingots, earmark steel for export and allocate finished steel going to essential domestic consumers. Limited price control would be exercised on pig iron and some finished steel items.

This proposal for even partial controls should be weighed carefully. Last week Winston Churchill asked Britain to abandon controls so that she can produce in the way the United States is producing without controls. The Labor government came within 24 votes of disaster because of complaints over rationing.

How odd it would be if we were to find ourselves reviving controls while Britain—disillusioned—was abandoning them! —p. 62

* * *

BETTER METALS NEEDED: All signs point to forthcoming demands upon metallurgy that are more exacting than anything experienced heretofore.

Two weeks ago, Robert F. Bacher, speaking at the annual dinner of the American Society for Metals, outlined the role of metallurgists in efforts to harness atomic energy. While much that he said was too technical to be understood by laymen, the essence of his remarks was that metals far superior to anything now available must be developed if we are to enjoy the full potential of atomic energy.

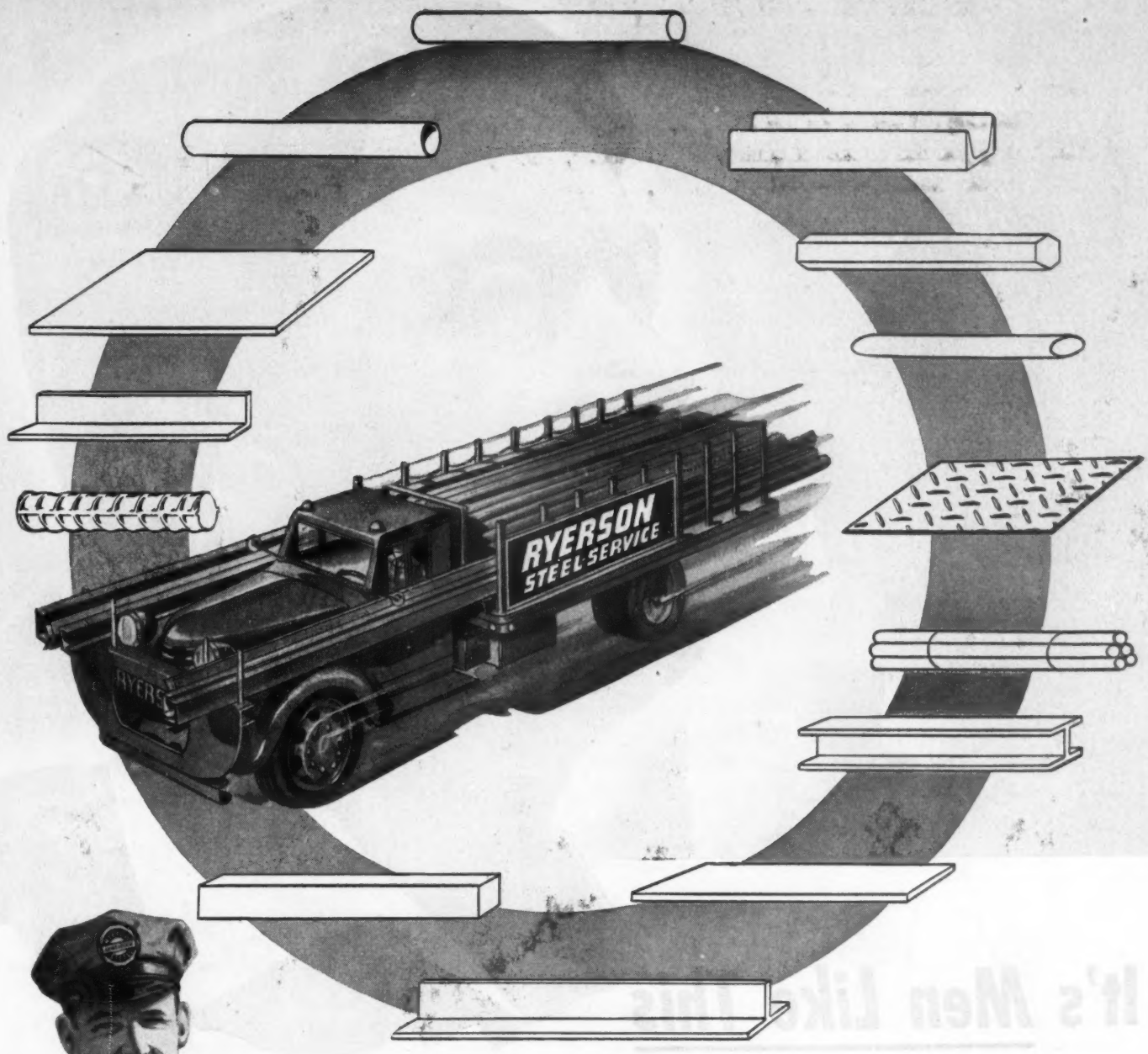
An almost identical assignment now comes from the Army Ordnance Association. Discussion by members of this body indicates that materiel that won World War II is outmoded and that today we need metals that will satisfy new requirements in strength and in resistance to impact under wide variations in temperature.

Metallurgists are notably resourceful. We think they will meet these challenges. —p. 71

SIGNS OF THE TIMES: In spite of shortages of materials and facilities, America's workshop is turning out goods in tremendous volume. This publication's index of industrial production for the week ended Oct. 25 (p. 80) stands at 167 per cent of the 1936-1939 average —a new postwar high. . . . Following closely on the heels of the dedication of a new $3.5 million manufacturing research department by International Harvester Co. in Chicago (p. 72) was the dedication last week of the first laboratory and pilot plant of the research center (p. 73) Johns-Manville Corp. is building on the Raritan river near Manville, N. J. . . . At a symposium held in Cleveland on modern metal protection (p. 90) it was stated that the estimated cost of corrosion of upwards of $10 billion annually would be multiplied many fold if it were not for the use of protective coatings. In the United States alone the cost of the raw materials used each year in the protective coatings industry exceeds a half billion dollars and the labor cost of applying the coatings is several times the raw materials cost. . . . Ford Motor Co. and Kaiser-Frazer Corp. have contracted for 14 and 7 per cent, respectively, of the pig iron output of the government-built blast furnace at Daingerfield, Tex. (p. 78), which Lone Star Steel Co., present lessee, is seeking to purchase. . . . Department of Commerce and National Military Establishment have announced that effective Nov. 1 controls over exports to Germany, Korea, Japan and former Japanese mandated islands now under military control (p. 70) will be relaxed to permit increased private trading with the occupied areas. . . . In 1948 models, Hudson Motor Car Co. has carried integration of body and frame further than has any contemporary automobile builder. The result (p. 75) is a car only 60 in. high, with adequate leg room, headroom and road clearance; low center of gravity; and rear seats positioned entirely ahead of rear wheels. . . . A 122-ton open-hearth furnace at the South Works of Carnegie-Illinois Steel Co. at South Chicago has been rebuilt with basic refractories (p. 112) for experimental use under commercial conditions to determine the economic and metallurgical advantages obtainable from a basic lining and to study the application of oxygen as a combustion supplement.

E. L. Shaner

EDITOR-IN-CHIEF



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Bulkheads and other parts of the Normandie, one-time queen of the sea, are shown as scrap to be hauled to the open hearths of the Lukens Steel Co., Coatesville, Pa. While the photograph shows a sizable quantity of scrap, it is only a comparatively small part of Lukens' daily requirements of 1600 *tons*

STEEL
November
3
1947

Scrap Scarcity Threatens Steel Rate

Abnormally high prices fail to bring out additional material, due to nationwide depletion of reserves during war. Ranks as No. 1 limiting factor in ingot output. Pig iron, coke and coking coal also in short supply

INVOLUNTARY curtailment in the current high rate of steel production and consequent increased hardship for steel-hungry manufacturing companies looms as the result of acute shortages of scrap and other raw materials.

Scrap, which has been in tight supply since the early days of the war, is becoming increasingly scarce. It now is firmly established as the No. 1 problem in maintaining steel output at near-capacity levels, and has been chiefly responsible for holding production under rated capacity since the war.

Pig iron, high-quality coke and coking coals also are in short supply and are limiting factors in steel production. Iron ore has not yet become a problem, although the supply is not too plentiful.

Stocks Low—Scrap inventories at steel mills generally are below normal for this season. Eastern mills report stocks average three to four weeks, against a normal of two to three months. One Mahoning Valley mill has only 20 days' supply. Pittsburgh mills generally have four to six weeks' supplies. West Coast mills say the supply situation is tight in this normally surplus market.

The scarcity has created a strong sellers' market which zooms upward almost every time a major buyer enters the market. The historic relationship between scrap and pig iron prices has long since been tossed into discard and within recent days No. 1 heavy melting steel sold at Pittsburgh at $7 a ton more than basic pig iron. Scrap prices recently have been 100 per cent or more above OPA prices during the war.

Mills have been attempting—not very successfully—to resist the rising market. During the latest price flurry major steelmakers withdrew from the market and threatened to stay out until scrap prices subsided, even if it meant shutting down open hearths.

Threatens Price Stability — Other steelmakers have warned that continued rises in scrap prices will necessitate new upward revisions in steel prices.

An unfortunate aspect of the recent scrap market is that price rises do not bring out additional material, as would have been the case in the prewar market. This indicates the severity and extent of the shortage. The remote areas at one time were good for whatever scrap was needed and all that was necessary to bring it out was a rise in prices at steelmaking centers to pay the costs of collection and freight.

Causes for Scarcity—The scarcity has arisen from a number of factors, the most important of which are: (1) Large prewar exports of scrap (about

15 million tons from 1935 through 1939); (2) tremendous war shipments abroad, for lend-lease, military equipment for the Allies and in munitions; (3) slowing up of the normal return of obsolescent scrap through the normal process of replacement.

The principal hopes for maintaining fairly adequate supplies at the mills now lie in: (1) Accelerated scrapping of the remaining war surplus materials; (2) prompt return of industrial scrap; (3) more vigorous return of obsolescent scrap as it can be made available. The scrap and steel industries have been doing all within their power to get industrial and obsolescent scrap to the mills, but both are critical of government delay in scrapping war surplus.

Secretary of Interior J. A. Krug, who recently surveyed this country's resources in connection with the foreign aid program, was so impressed by the scrap shortage as a steel production bottleneck that he last week called upon the domestic mining industry to rush all scrap at mining installations back into consuming channels. He estimates 200,000 tons are available at the mines in the form of power shovels, hoists, locomotives, rails, mine cars and tools of various types.

Pig Iron Scarce—Blast furnace facilities are being used only at about 90 per cent of capacity. Some government-owned furnaces are idle for lack of coke, blowers, or poor furnace condition. Some private stacks likewise are hampered by local coke shortages and others are operating below rated capacity because of the poor quality of coke available.

Certain furnaces which now are operating under the government's premium price plan may be shut down at the beginning of the year when the subsidy program, providing for payments of $6 and $12 a ton, ends. Premiums have been paid for between 600,000 and 900,000 tons of pig iron annually.

Need More, Better Coke—Increased pig iron production would need to be accompanied by an increase in coke supply and an improvement in the quality of coke. One Youngstown producer reports iron production is down 20 per cent because of the poor quality of coke. Others are complaining about the unusually high ash content of available coke.

Partially, this is believed due to the increase in exports of high quality coking coal. Bureau of Mines authorities say that fully 50 per cent of the nearly 50 million tons of coal exported during the first 11 months this year is coking quality.

Krug Finds Nation's Nonferrous Metal Reserves Being Depleted

Foreign countries may be asked to ship scarce metals here in partial payment for aid under the relief and rehabilitation program being formulated. Domestic resources adequate to support active economy in only a limited number of minerals

FOREIGN countries receiving aid from the United States under the relief and rehabilitation programs now being formulated may be asked to ship nonferrous metals to this country in partial repayment.

This suggestion is contained in the recent report on "National Resources and Foreign Aid" prepared by a committee headed by Secretary of Interior J. A. Krug.

MINERALS PROGRAM

Plans for a "dynamic" minerals program to be presented Congress by the Truman administration were outlined last week by Secretary of the Interior Krug speaking at the metal mining convention of the American Mining Congress in El Paso, Tex. He indicated that subsidies aimed at keeping domestic mines in operation and building up of strategic stockpiles may be included. Several subsidy proposals are now under consideration for this purpose, he said. To advise Congress and the President in further development of a sound national minerals policy, Secretary Krug said he expects to name a minerals council some time this month.

Domestic reserves of most nonferrous metals are being depleted rapidly and the United States is self-sufficient in only a few; for many, it is largely dependent upon imports.

Supply Situation — The United States has adequate resources in magnesium, molybdenum and vanadium. Chromite, nickel and tin are conspicuous by their absence in this country. Domestic resources of copper, lead, zinc, bauxite, manganese, tungsten, antimony, cadmium, and mercury are not adequate to supply demand for an active economy and some imports are necessary.

Generally, the United States has adequate capacity for processing these metals; the shortage is in ore.

Aluminum — War-expanded aluminum plants are more than adequate to fill this country's peacetime needs. Privately-owned and leased primary aluminum capacity is 650,000 tons annually while current consumption is estimated at 525,000 tons. In addition, there is high-cost government-owned capacity, currently idle, of 230,000 tons. Neighboring Canada has 250,000 tons of low-cost capacity, which is currently idle.

United States, however, depends on foreign mines for about 50 per cent of the bauxite used in aluminum reduction. Were no bauxite imported, the depletion of domestic bauxite reserves would be serious by 1952.

Magnesium—Production and fabrication capacity currently exceed needs. Raw material reserves are boundless, and domestic production costs, particularly from seawater plants, are perhaps the world's lowest.

Copper—Domestic production is insufficient to meet present demand which is abnormally high owing to accumulated needs resulting from diversion of supplies during the war. Large imports are required to make up the deficit.

Output of copper from domestic mines over the next five years is expected to fall a million tons short of expected needs. Domestic production this year will be about 900,000 tons in 1947 and will decline to an average of 825,000 tons per year from 1950 to 1952.

Consumption for 1947 will approximate 1,250,000 tons and will drop to about 950,000 tons by 1950 and 1952.

Lead—Domestic mine production plus secondary recovery cannot be expected to exceed an average of 800,000 to 850,000 tons annually. Domestic demand in an active economy will average 1,200,000 tons or more. Deficit must be met from imports.

Outlook for substantial increase in world production in near future is unfavorable because developed reserves are seriously depleted and current production rates represent

near-capacity operations. Consequently, consumption will have to be curtailed, either through economic forces or through national and international controls.

Tin—United States' supply of virgin tin is derived from metal imports and the output of a government-owned smelter operating on imported concentrates. Metal imports in 1946 were only 15,500 long tons, but these should rise rapidly as the principal source of the material—the Far East—is rehabilitated. By 1950, world production is expected to reach a level assuring adequate supplies.

Zinc — For the next five years, United States zinc needs will average about 880,000 tons a year, to be met by slowly declining production at home and gradually increasing imports.

Stockpiles accumulated during the war contain some 300,000 tons of recoverable zinc, assuring against any short-term interruption to supply.

Outlook for increased foreign output is good and zinc supplies are expected to be adequate.

Chromium—United States, largest user of chromium, possesses no significant commercial reserves and is almost entirely dependent on foreign sources. World production has dropped almost 50 per cent from the wartime peak and a shortage for the near-term is indicated. In Rhodesia, major ore supplier, exports have been hindered by transportation difficulties.

Receipts of foreign ores are expected to increase in the next few years, however, and a balance of supply and demand is likely by 1950.

Manganese—Imports of manganese ores during 1947 will approximate 1,700,000 tons. Domestic production will add 150,000 tons, bringing the total available to 1,850,000 tons. Consumption, based on an 85 million ton steel year, will be 1,500,000 tons, leaving 350,000 tons available for stockpiling or export.

Molybdenum—Resources are adequate. Domestic consumption will average about 32 million lb annually. Peak production has exceeded 60 million lb and 50 million lb output can be easily continued through 1952.

Nickel — United States is almost wholly dependent on foreign sources for requirements which were about 80,000 tons in 1946. Needs can be met from Canadian output which can be expanded to 125,000 or 130,000 tons annually.

Tungsten—Domestic production is inadequate for requirements of 8000 to 10,000 tons annually. About half of needs can be produced in this country if prices continue high. Remainder can be obtained from South America, Mexico, Canada, Australia. China is leading producer but is selling most of output to Russia.

Vanadium — Domestic production and requirements now are nearly in balance. Recently established payments for the uranium content of western carnotite ores will stimulate vanadium production and will provide a surplus above current domestic needs.

Antimony—Supply is short and outlook for major improvement in immediate future is not favorable unless China re-enters international trade and resumes its position as chief supplier. New supplies in 1947-48 are estimated at 5000 tons from domestic ore, 5000 to 7000 tons from foreign ores, and about 20,000 tons from secondary sources. Domestic requirements are expected to total 45,000 to 48,000 tons. Deficit now being met by use of war reserves.

Cadmium—United States supply through 1952 will be about 7 million lb recovered almost entirely at domestic refineries. No substantial quantity of refined cadmium is imported but much of the metal enters the United States as flue dusts and to a lesser extent in imported zinc ores and concentrates. Domestic demand likely to continue in excess of supply.

Superior Steel Corp. Lets Contract for Strip Mill

Superior Steel Corp., Pittsburgh, has placed a contract for 3-high roughing hot mill and auxiliary equipment to supplement the modernization program started in April, 1946, according to Carl I. Collins, president. The new mill will enable the company to manufacture hot-rolled clad metal and alloy strip in widths up to 24 inches and thus serve in meeting the increasing requirements for wider strip. The mill, ordered from Lewis Foundry & Machine Division, Blax-Knox Co., Pittsburgh, is expected to be ready by Jan. 1, 1949.

Present, Past and Pending

■ OXYGEN PRICE INCREASED 10 PER CENT

NEW YORK—Price of oxygen shipped in cylinders for industrial use has been increased 10 per cent by Linde Air Products Co., subsidiary of Union Carbide & Carbon Corp., and by Air Reduction Co., the two largest producers. Oxygen is widely used by the metal trade for welding and cutting.

■ CONTRACT FOR NEW OPEN HEARTH AWARDED

CLEVELAND—Contract for a new 175-ton open-hearth furnace at Otis Works of Jones & Laughlin Steel Corp. has been awarded to the Loftus Engineering Corp., Pittsburgh, and construction work has been started. The furnace will be the ninth open hearth at the works.

■ FTC REVISES STEEL INDUSTRY COMPLAINT

WASHINGTON—Federal Trade Commission is revising its complaint against the steel industry and the amended complaint is expected to be released this week. Steel industry counsel, John W. Davis, has asked for a further extension in time for filing respondents' answers to Nov. 17.

■ BUFFALO BOLT TO BUY PENBERTHY INJECTOR

NORTH TONAWANDA, N. Y.—Buffalo Bolt Co. is planning to acquire the outstanding capital stock of the Penberthy Injector Co., of Detroit, maker of products utilized to regulate and measure the flow of liquids. Holders of Penberthy common stock will receive $44.50 a share, payable in cash, and preferred stock in Buffalo Bolt.

■ TARIFF SCHEDULE REVISED DOWNWARD

WASHINGTON—Almost the whole tariff schedule of the United States is revised downward by the 23-nation agreement at Geneva, Switzerland. Details of the agreement will not be made public until Nov. 18, but reductions are reported to be made in machinery, electrical apparatus, office machinery, motor vehicles and other metal products.

■ USES OXYGEN IN ELECTRIC FURNACES

SHARON, PA.—Sharon Steel Corp. has been experimenting with the use of oxygen in its electric furnaces and results indicate its use can speed up steelmaking in the electric furnaces as well as in open hearths.

Price Control Hard Nut for Congress

Fighting inflation to be harder task than extending aid to Europe. Administration contemplates controls for certain key commodities

WHEN Congress convenes in special session Nov. 17 to tackle the dual problem of formulating a foreign aid program and of combating inflation at home, it is likely to find the former less difficult than the latter.

While the extent and method of extending aid to Europe will be subject to voluminous debate, the overall outcome hardly can be doubted. Substantial aid will be approved. This will cover both short-term relief and long-term help in rehabilitating the economies of western Europe.

How to stem the tide of rising prices will be a harder task. As yet no program for dealing with inflation has been advanced. Suspicion is strong that the administration does not yet have such a program.

Enter Politics — Many observers fear the inflation control problem is in danger of becoming muddled by the injection of 1948 campaign issues. Indications already point in this direction.

The Republican leadership has announced it will press for adoption of a tax reduction program at the special session.

The CIO-Political Action Committee will insist on full restoration of price controls and will fight the Republican attempt to bring up tax relief.

The administration is likely to lean more toward the CIO-PAC line, although it is doubted that it will recommend complete rationing and price control. The difficulties of instituting such controls are too formidable and the administration realizes it is unlikely to win Republican support for such extensive government controls.

May Attack Key Commodities — Current thinking by White House economists is running to the application of controls to certain key commodities which largely sway the entire economy. Steel, coal, corn and wheat have been mentioned specifically.

The controls, according to tentative plans, would be applied at a single level—at the stage where the primary producer sells these key products for further manufacture, processing or distribution to consumers.

At a recent press conference, the President described rather vaguely what might be done in the case of steel. The procedure outlined would ask the Congress to authorize the administration to: (1) Allocate the amount of ingot tonnage that could be rolled into each finished product; (2) continue to control the amount of steel to be exported; and (3) allocate steel to domestic industries producing products badly needed in the domestic economy. As an example, tonnages of steel for freight cars, tin cans, pipelines and some military items would be allocated.

After the key products had been taken care of and after export allocations had been made, the remainder of steel production would be available for uncontrolled distribution.

Price control, if this line of thinking is carried through, would be applied on mill sales of the products which the mills ship. Pig iron would be controlled. Ingots would not, because little steel is sold in ingot form. Semifinished steel, plates, sheets, strip, pipe, wire and other finished steel products would be subject to price control.

The administration economists think, or hope, that such a price control system would carry through to a large number of manufactured products. While the majority of manufactured products would not be controlled in any way, these White House planners believe manufacturers would find themselves under a strong moral obligation to reduce or hold down prices.

Effectiveness Doubted — The flaws in such a program are considered obvious by industrialists. The only element of cost that would be controlled would be that of the primary raw material—steel. Few manufacturers have complained that the mill prices of steel products are out of line or are responsible for increased prices. Other factors contributing to higher costs, such as increased wage rates, low productivity, premiums paid to obtain delivery of materials, and shutdowns due to shortage of materials are vital in the price picture.

However, no one in Washington claims to have yet found the answer to the inflation problem and it is not likely that Congress will be presented with a ready-made solution when it meets two weeks hence.

Aid Program Readied—More progress will have been made on the aid for Europe program.

The Harriman Committee of For-

DRILL TOUGHENING: Ability to cut through tough metals is given drills in this furnace room where they are loaded into stainless steel baskets made by Stanwood Corp., Chicago, and heated to high temperatures in the cyclone type furnaces at the right. Baskets have been used for two hardening cycles a day for more than 3 years, their low oxidation rate and freedom from scaling having resisted the high temperatures for that time. Baskets are divided into four sections and have folding handles which permit stacking four-high in furnaces. Photo courtesy Electro Metallurgical Co., Chicago

eign Aid will have presented its report to the President in time to be incorporated in his recommendations to Congress. While details have not yet become available, it is understood the Harriman group figures steel shipments to the 16 countries to benefit under the Marshall Plan will be 2 to 4 million tons in the next year.

The Harriman report will discuss in some detail the financing of the aid program and plans for stabilizing the currencies of beneficiary countries. A committee spokesman indicates that some requests of the Paris conferees are considered too low and may be revised upward; others may be scaled down in light of the need for the commodities involved in this country.

The Council of Economic Advisers also will have placed a report in the President's hands, dealing with European aid. This also makes references to the possible need for modified price controls and rationing at home.

The extent of the nation's resources and their relation to the foreign aid program has been set forth in a report by a committee headed by Secretary of Interior J. A. Krug (STEEL, Oct. 27, p.52).

Outlines of the debate on foreign aid will be pretty well outlined before the special session meets by the Senate Foreign Relations and the House Foreign Affairs Committees. Both will meet Nov. 10 and probably will continue in near-continuous ses-

(*Please turn to Page* 177)

U. S. Steel Chairman Optimistic For 1948; Sees No Early Slump

OUTLOOK for next year is one of continuing high demand for virtually all types of steel, Irving S. Olds, chairman, United States Steel Corp., declared at a press conference last week, following the corporation's quarterly meeting of directors.

Only some unforeseen labor development or adverse international conditions, or some other factor clearly not in the picture at present could dim present good prospects, in his opinion. He emphasized that he was not one who looked for any early depression around the corner.

Mr. Olds' optimism found support in the action of the corporation directors in declaring a dividend of $1.25 a share on the common, which is on the basis of $5 a year (although the chairman stressed that dividend action on common is based on conditions prevailing at the time of the declaration), and announcing of a special dividend of 75 cents per share on the common.

Also, as Mr. Olds pointed out, optimism finds support in the corporation's huge half billion dollar expansion program, which has been under way for some time, although lagging because of conditions beyond the corporation's control, such as labor disruptions and shortages of materials and equipment, especially electrical.

No serious consideration, Mr. Olds said, was being given at this time to further price increases, although costs were steadily advancing. With regard to possible government allocations, he said he knew no more than he had read in the newspapers. He personally rather doubted there would be such action, although he said it might be well to wait and see how the Marshall Plan is going to unfold.

Commenting on the corporation's expansion program, he said that the new facilities will represent a net increase. In other words, no existing equipment will be written off as the new comes into operation. At least that is the way it looks at present.

While establishment of major steelmaking facilities along the eastern seaboard has been under contemplation for a long time, no decisions have been reached and no property has been purchased, he asserted. Questioned concerning development of additional foreign ore properties, which would be an important consideration in establishment of a large eastern seaboard plant, he said that company geologists continued to investigate various properties abroad—in South America, Sweden and Canada, among other sections, but so far the corporation has made no new purchases.

Summary of Net Earnings of Steel Producers

	Third Qtr. 1947	Second Qtr. 1947	First Qtr. 1947	Third Qtr. 1946	First 9 Mos. 1947	First 9 Mos. 1946
United States Steel Corp.	$28,735,082	$29,336,868	$39,234,511	$33,329,353	$97,306,461	$57,467,894
Bethlehem Steel Corp.	10,211,336	12,408,966	16,090,426	10,543,005	38,710,728	29,794,650
Republic Steel Corp.	6,380,016	5,214,820	11,516,795	5,039,071	23,111,631	9,494,414
Jones & Laughlin Steel Corp.	4,979,482	5,366,124	6,337,132	2,952,716	16,682,738	6,109,260
Youngstown Sheet & Tube Co.	5,817,698	6,293,389	7,335,749	4,871,852	19,446,836	9,176,395
Inland Steel Co.	7,670,295	6,125,431	7,995,857	4,927,473	21,791,583	9,900,773
American Rolling Mill Co.	5,934,418	6,312,104	5,918,876	5,466,068	18,165,398	12,488,684
Wheeling Steel Corp.	2,640,189	2,841,804	2,948,268	2,085,120	8,430,261	3,188,041
Crucible Steel Co. of America	23,639	376,214	891,810	251,436	1,291,663	203,720
Colorado Fuel & Iron Corp.	1,397,904	716,232	1,712,323	1,025,126	3,826,459	1,100,393
Sharon Steel Corp.	1,375,000	1,498,247	1,886,918	1,493,715	4,760,165	2,042,350
Alan Wood Steel Co.	439,096	502,432	491,593	463,515	1,433,121	330,140
Allegheny Ludlum Steel Corp.	1,036,332	1,688,031	1,829,609	2,113,012	4,553,972	4,559,139
Continental Steel Corp.	357,036	248,231	393,223	303,033	998,490	694,148
Barium Steel Corp.	401,280	408,429	380,694	*89,243	1,190,403	*129,815
Rotary Electric Steel Co.	145,475	195,164	205,949	140,401	546,588	392,593
Portsmouth Steel Corp.	907,451	1,024,359	1,009,321	417,850	2,941,131	
Granite City Steel Co.	436,495	316,591	398,295	*216,173	1,151,381	1,197,757
Totals	$78,888,224	$80,873,436	$106,577,349	$75,117,330	$266,339,009	$148,010,536
Finishing Capacity Only:						
Acme Steel Co.	$1,388,194	$2,081,732	$2,055,118	$1,211,685	$5,525,044	$2,920,679
Superior Steel Corp.	282,064	383,608	275,743	236,800	941,415	673,423
Pig Iron Capacity Only:						
Interlake Iron Corp.	$1,251,043	$1,235,106	$965,031	$636,083	$3,451,180	$1,117,356
Woodward Iron Co.	1,109,157	935,791	959,208	599,403	3,004,156	1,076,208
Sloss-Sheffield Steel & Iron Co.	480,251	433,297	439,101	266,979	1,352,649	294,816

*Loss.

NLRB Developing Procedures and Policies Under Taft-Hartley Act

Good progress reported in functioning under new labor relations law. Important decisions already made, including dismissal of more than 50 complaints of unfair labor practice. Union shop elections started. Injunctive power being tested

REVAMPED National Labor Relations Board has made a good start setting policies and procedure under the Taft-Hartley Act since it became effective Aug. 22. While exemption of top AFL and CIO union officials from the need for filing anti-Communist affidavits got the most headlines recently the board has made other important decisions in administering the new law.

It has dismissed more than 50 complaints that cited refusal of employers to bargain with foremen and supervisors as an unfair labor practice. It has started to permit elections under the union shop provision.

Injunctive Power—Most important, it has started a campaign to determine what the courts will decide in regard to the injunctive power given by the Taft-Hartley Act. Three cases are involved so far, at Albany, N. Y., Chattanooga, Tenn., and a case involving the United Mine Workers in Kentucky. In the first two cases, involving the secondary boycott, the unions went back to work without waiting for the court decisions.

The new policy in ordering elections to determine the bargaining agent has been instituted, and there now is a chance to get undesirable unions out of the picture—provided the employees order a change. Several cases involving decertification of unions are in the works.

Unfair Labor Practices—The board has shown willingness to proceed on employers' charges of unfair labor practices in a number of cases, notably that involving the AFL Typographical union in Baltimore. There the union had refused to bargain, and later sought to evade the law by imposing the closed shop by dictating the terms and conditions under which its members would be permitted to work.

The technique for handling jurisdictional disputes has been worked out. Whenever it is charged a union is engaging in or encouraging a jurisdictional dispute, the NLRB regional director will assign a priority to that case.

Employers, encouraged to believe the injunctive provision is going to protect them against labor abuses generally, are warned not to be too optimistic. Just because there is an unfair labor practice is no reason for assuming that the board will ask a court for a restraining order. As a matter of fact, the board will not act on most of such petitions.

General Counsel Robert N. Denham, discussing this point, said he believed that Congress did not intend that injunctive relief be invoked as a sort of preliminary cease and desist order every time a labor organization is charged with an unfair labor practice.

Still in Fog—On some questions the board still is in a fog. It has not decided what to do about discriminatory discharge of employees as complained about in cases that arose prior to Aug. 22. How far the board needs to go to carry out the intent of Congress as expressed in the Taft-Hartley Act is still a matter for debate. This question, incidentally, is the one that is most touchy with unions. In the old days unions often would demand, under threat of unpleasant reprisals, that one or more workers be discharged—and in such cases the bedeviled employer often gambled against the probability that he later would be forced to dig into his pockets for back pay. The new act makes discharge at the instance of a union permissible only when there exists a union shop contract, and then only for failure to pay dues; it further provides that when a discharge is made illegally at the demand of the union, the union becomes liable for any back pay that may be found due. This is the provision which, unions claim, handicaps them in disciplining their members.

The board also is faced with a difficult problem in drafting practical and acceptable regulations to carry out the congressional intent that employees must not be forced to join unions through coercive measures.

Perplexing Question — Perplexity surrounds the question of deciding what is "featherbedding" under the Taft-Hartley Act. Employers will be interested in the view of Mr. Denham, as follows:

"The term featherbedding, as it seems to be used throughout the industry, is much broader than the provisions of this section of the Act. I have heard it applied in cases where the union rules required an employer to hire six men to do a job that two could do. Or to provide made work which normally would be performed incident to general operations. Or to the union's requirements for call-in pay; and some have even applied it to paid holidays. But within the purview of this section as it is written, the term has a decidedly narrow limitation. Standby crews, for example, who simply are present and do nothing come within the proscriptions of this section; and it makes no difference whether they are sheet metal workers hired to stand by while an iron worker does a job because of a jurisdictional dispute, or musicians who are held in the anteroom of a radio station while the disc jockey is turning platters in the control room. The gist of this section is

APPRENTICE PROGRAM

Determination of the number of apprentices needed in every community in the skilled trades today and in the immediate future is one of the greatest responsibilities of industry at this time, according to William F. Patterson, director, Apprentice-Training Service, Department of Labor.

"It is especially important," he says, "that industry knows how many apprentices are needed for a number of reasons: The last census of skilled workers was taken in 1940 and we have no knowledge of how many craftsmen due for retirement have done so, how many have died and how many have left their trade for other work since that time; also, during the war years relatively few apprentices were trained."

A yearly study should be made in every area, Mr. Patterson says, by local management-labor committees, or where none exist by employer organizations or unions, "to ascertain the number of skilled men in the trades, the average age of skilled workers, the rate of loss to industries, number of apprentices in training, an estimate of the volume of production, building and service required over a period of years, the number of skilled workers needed and the number of apprentices each trade needs."

that the payment is made for services 'which are not performed or not to be performed.' Thus, when the teamsters halted trucks at the mouth of the Holland Tunnel and required the driver to put a member of the teamsters union on the seat in order to qualify to deliver the load in New York city, and to pay him a full day's wages for taking the ride, I don't doubt that the owner of the truck called it 'featherbedding,' but I have great doubt that it could ever be brought within the terms of this section of the statute. On the other hand, if the driver accepted the option which often was tendered to him of paying the money but waiving the privilege of having his 'helper' ride with him, we have a situation where there were no services performed or to be performed, and probably a violation."

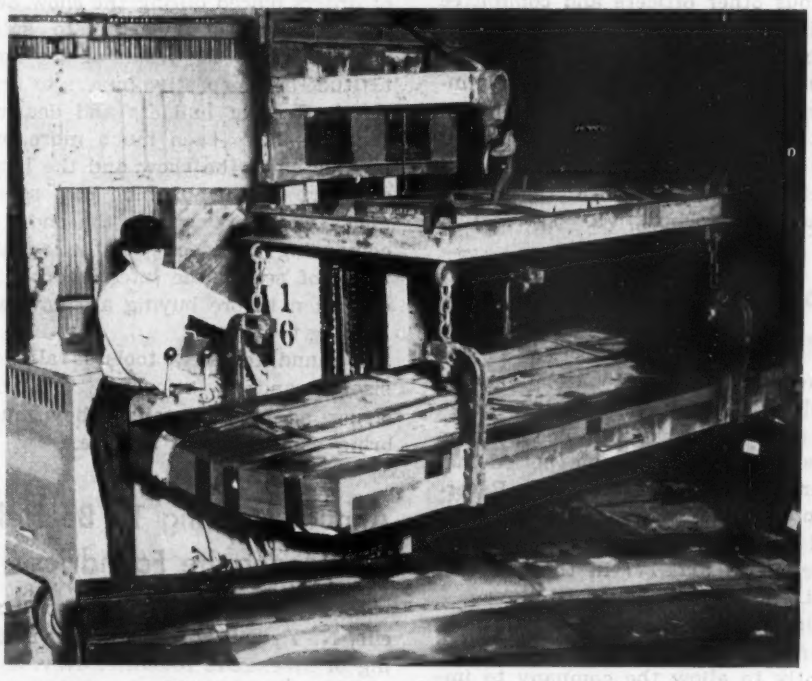
Keep Informed—Employers should keep in touch with their state agencies and keep informed on the policies and procedures of these agencies. The Taft-Hartley Act allows the NLRB to cede jurisdiction over labor disputes—even when interstate commerce is involved—and the board now is working out arrangements with the disputes machinery officials in the states.

One of the welcome changes, to employers, is elimination of the old review staff. In that setup, trial examiners and trial attorneys wrote many of the board's decisions, and it gave rise to widespread charges of bias. Now the board is a quasi-judicial body and does its own deciding. This is not to say that the NLRB in the near future will take on the atmosphere and dignity of the Supreme Court. But a really judicial attitude may well be encouraged by elimination of the review staff.

Pig Iron Production Rate Gains Slightly in September

Production of pig iron increased during September to a daily rate of 158,005 tons compared with 156,662 tons in August, although the total for the month eased slightly to 4,740,164 tons from 4,856,513 tons due to the shorter month, according to the American Iron & Steel Institute. Production of ferromanganese and spiegeleisen increased to 60,456 tons from 60,044 tons, making total blast furnace output for September 4,800,620 tons, or 89 per cent of capacity, compared with 4,916,557 tons, or 88.1 per cent of capacity, in August.

Total blast furnace output for the first nine months of the year came to 43,787,594 tons, equivalent to 89.1 per cent of capacity.



MOVING PACKAGES OF STEEL: Up to 6000 pounds of steel sheet, bound in packages, can be moved by an electric industrial truck equipped with the grab carrying device illustrated. In operation in the Butler, Pa., plant of American Bantam Car Co., the device may be substituted for the truck's conventional forks in less than 2 minutes. It is reported that 40 tons of packaged sheet may be moved from receiving dock and warehoused in 2 hours by truck operator and two helpers

Gear Men Seek Answer to Many Trade Problems

Subjects varied at Chicago meeting of AGMA. Statistical services expanded to determine machining rates

CHICAGO

MORE than 300 members and guests of the American Gear Manufacturers Association gathered at Edgewater Beach Hotel, Oct. 26-29, for the semi-annual convention of this "engineering body of the gearing industry."

Actually, the agenda of this meeting indicated clearly that the activities of AGMA now extend considerably beyond engineering in that much attention now is being devoted to statistical studies and to business and selling methods calculated to help this industry toward greater efficiency in its overall operations.

A permanent statistical staff has been established at headquarters in Pittsburgh, and investigations are being made of all operations involved in gear making with the view of determining true cost of these operations, various overhead expenses, etc.

Outlook Promising—Present reports indicate a continuing high level of operations, but shortages of steel, motors and various other materials and components are hindering manufacturing and assembly operations. Various members also reported that continuing rise in prices and possibility of further wage increases make the establishment of firm prices difficult if not impossible. Therefore, "escalator clauses," which it was hoped could by now be given up, are in many cases being continued.

One of the features of this meeting was a commercial forum set up on the basis of a "quiz session" featuring seven specialists under the chairmanship of Fred W. Walker, vice president, Philadelphia Gear Works. It may be significant that much of the discussion was devoted to the meaning of the Taft-Hartley Act and its importance both to employees and employers.

The importance of getting working people to understand that this act was drafted for their protection and benefit just as much as for that of employers was stressed.

Interpreting Industry—The importance of interpreting modern industry

and modern economics to working people and to the "man in the street" also were the main theme of a talk by G. Edward Pendray, public relations consultant, who was guest speaker at the formal dinner. Mr. Pendray showed how vague and incomplete financial reports of large companies serve to perpetuate the myth of tremendous profits to management and stockholders at the expense of workers.

He condemned the typical "pie chart" in these reports as a big offender in that the worker compares his share of the pie to all the rest of the pie, without studying the breakdown of the balance of the pie. Mr. Pendray is not impressed with the job that industry is doing in getting down into the grass roots with the truth about private enterprise and the advantages to workers of the American system of industrial management. He urged that the methods of more successful propagandists be studied and followed without delay, as an eleventh hour antidote to infiltration of communism in this country.

Russian Methods — Another guest speaker who had something to say about the methods being followed by Russia was Simon Davidian, an authority on the Near East. Mr. Davidian described the setup of the growing fringe of autonomous Soviet Republics now developing beyond the original borders of Soviet Russia, under the influence of the Stalin regime. These, he said, can be used for expansion or even aggression, without openly involving Russia proper.

Technical papers at this meeting included a treatise on the design and manufacture of hourglass gear units of the Cone patented design by F. E. Birtch, Michigan Tool Co., and a general paper on modern application, design and manufacture of gears by L. J. Collins, research engineer, General Electric Co. These papers stressed the degree to which modern mathematics, engineering, materials and machines have contributed to making possible in everyday use gears and gear mechanisms which a few years ago existed only as theoretical dreams.

Throughout the four days of the meeting a constant series of important committee meetings was under way covering subjects such as splines, worm gearing, spur gearing, bevel gearing, materials, lubrication, gear cutting tools, inspection, nomenclature and trade practices.

Compliment Officials — Many compliments were paid to Ray B. Tripp, 1947-48 president, AGMA, who is executive vice president of Ohio Forge & Machine Corp., Cleveland, to Newbold C. Goin, executive secretary, to various other officers and committee chairmen, and to the headquarters staff, for the organization and smooth running of such a large meeting involving such a wide variety of activities. At the close of the meeting, it was announced that the 1948 annual meeting would be held at the Homestead, Hot Springs, Va.

LASTING INFLUENCE

To avoid misunderstandings, Pratt & Whitney Division, Niles-Bement-Pond Co., East Hartford, Conn., tells its employees in the current issue of its company publication these facts:

The recent machine tool show cost the company $110,000. A few sales will be completed at once but there will be no flood of orders resulting from the show. However, its influence will be felt for years to come. Most companies figure it takes an average of two years to sell a machine tool in normal times.

During the past two years, P. & W. has started to prepare for production of several completely new or completely redesigned machine tools. Cost of designing and tooling up for these new machines is $1,500,000, of which more than $1 million is yet to be spent in the next year or two. The show was the opening wedge beginning a vigorous sales campaign aimed at securing sufficient orders to make production of them profitable.

Monarch's Third Quarter Net Earnings Show Drop

Net earnings of Monarch Machine Tool Co., Sidney, O., for third quarter showed a substantial decline from those of the comparable period last year, according to Jerome A. Raterman, president. Earnings after taxes and other charges were $149,169 compared with $171,177 in the 1946 period.

Order backlogs, although still substantial, have been reduced sufficiently to allow the company to improve its deliveries of machine tools, Mr. Raterman said. "The number of inquiries we have been receiving since the Machine Tool Show has been considerable, and we are hastening to complete the additional tooling necessary to get these newest machines into production," he added.

Higher Volume Of Tool Buying Seen in October

Spadework in September expected to pay off for builders as customers see need for modernizing equipment

IMPACT of the 1947 Machine Tool Show had not yet reached the order books of machine tool builders by the end of September and ordering was only 1 per cent greater in that month than in the postwar low month of August, according to figures compiled by the National Machine Tool Builders' Association.

Shipments Show Gain—The industry's shipments in September, as estimated by the association, however, had recovered from vacation periods in July and August but were to some extent interfered with by preparations being made for the show. These shipments at $22,520,000, although 22 per cent above those for the previous month, were well below those for any other month this year.

A jump in placement of new firm orders was reported by the trade in October, due in part to confirmation of orders placed during the show and in even greater measure to sales made later as the result of the new attitude of prospective buyers to representatives of builders and dealers. Inquiries have been much more numerous since the show and the largest part of the machine tool salesmen's work previous to the show in convincing prospects of the advantages of seeing the latest models in operation before buying are now beginning to pay off.

Demand for new tools is already sizable and is expected to grow larger as buyers realize they must bring equipment up to date.

Annual Meeting To Be Held For Meehanite Foundries

Meehanite Metal Corp., New Rochelle, N. Y., will hold its annual meeting of Meehanite foundries Nov. 5, 6, 7 and 8 at Hotel Carter, Cleveland.

Opening event will be a dinner meeting at 6 p.m. Nov. 5 for executives of Meehanite foundries. Technical papers will be presented in the morning and afternoon of Nov. 6 and 7. Annual banquet is scheduled for the evening of Nov. 6.

New Allocation Plan for British Steel Awaited

Scheme expected to prevent overselling available steel and to base quotas on consuming industry's importance

BRITISH steel consuming industries are looking optimistically toward the government's new plans for steel distribution which will be put into effect this winter.

Plan includes review of the workings of existing steel controls and provides for allotment of available steel on the basis of the various industries' relative importance. Furthermore, actual deliveries must be made in accordance with allocations.

Consumers, previously, have received authorizations for steel purchases in excess of allocations and the distribution system, therefore, has had order backlogs far in excess of production capacity.

Recommendations Approved — A special committee has examined the machinery of distribution with the assistance of the Trades Union Congress, the Federation of British Industries and the Iron & Steel Federation. Approval of the committee's report, recommending revision of control methods to get rid of the excessive volume of authorization forms and prevent the recurrence of sales in excess of output, has been given by the government.

The committee further recommended the general basis of the existing scheme should be retained but that its operation be overhauled, that a new form of authorization be introduced and that a general tightening up of administration of the scheme be enforced on government departments and industry. The scheme also provides a simpler method whereby the steel requirements of numerous producers of steel components in general use would continue to be met although these manufacturers might not directly export any of their products. It is hoped the new procedure will be introduced early next year.

Iron, Steel Output Rises—September steel prodction at an annual rate of 13,841,000 tons was the highest ever recorded in that month and was the highest monthly rate since 1943. It compares with the annual rate of 12,178,000 tons in August. Pig iron production also showed an increase, the annual rate being 7,805,000 tons against the rate of 7,660,000 tons in August.

As far as fuel is concerned, the fuel minister says overall requirements of industry of 24½ million tons will be met. Coal stocks were increased during the summer by 9 million tons to the 15 million-ton target, or 5 million tons more that the stockpile of last year.

Transportation difficulties have hampered the movement of iron, steel and coal, however. British railways are short of freight cars. Builders are in arrears in maintenance because of shortages of materials and labor and 16.5 per cent of the total cars are laid up awaiting repairs. In fact, 48,696 fewer cars are in service now than at this time last year.

GERMAN PLANT DISMANTLED: One of the 682 plants marked for dismantling for reparations by the British and Americans is the huge Fritz Werner machine tool plant in Berlin. During the war, the plant produced antiaircraft guns and recently has been making auto wheels, tool grinding machinery and simple tools. NEA photo

Increased Output of Belgian Steel Urged To Keep Country Abreast of Competition

BELGIAN steel producers are already looking toward the day when world-wide competition in sale of steel products returns. Recent statement by Baron de Launoit, a leading figure in Belgium's industry, points up the goal of the industry for some future date. The Belgian aim, he said, is not to produce as much as before the war but to produce more in order to keep abreast of world competition.

In his opinion, the country's output of steel, which has increased steadily from month to month and in the first seven months of 1947 was 30 per cent higher than for the corresponding period of 1946, is not increasing fast enough. The country's production must be stepped up in every existing facility and more productive capacity must also be added, he said.

At present, the two principal competitors are the United States and Great Britain, with the latter country's exports making a poorer showing now than in 1946. Belgian exports, on the other hand, were about 50 per cent above those for the first half of last year in the first six months of 1947.

Export Taxes to Boost Wages—Opposition is widespread among Belgian industrialists to the new export tax of 3 per cent, the opponents claiming it imposes an unnecessary handicap upon the export trade. Proponents say that its inevitable effect on prices in the export market will be offset by probable price increase in Great Britain and America. The tax has for its object accumulation of a fund for distribution among the country's workers in the hope these payments will prevent demands for higher wages. In a recent meeting of the labor council a proposal that companies whose profits had been substantial should abandon part of their earnings and distribute them among the workers was laid aside in favor of the export tax system of raising workers' pay.

Windows of Washington

By E. C. KREUTZBERG — *Washington Editor, STEEL*

Big point at issue in cement case, being argued before Supreme Court, concerns method of meeting competitors' delivered prices by freight absorption. Question parallels that raised in Federal Trade Commission action against steelmakers

STEEL company attorneys were interested listeners when the Supreme Court on Oct. 20 and 21 heard arguments in the 10-year old cement basing point case. It became apparent in the eight-hour proceedings that the one big point from a long-range view in the cement case is the very same point that is vital in the recently instituted action against the pricing system in vogue in the steel business.

The big question to be decided is whether the method of meeting competitors' delivered prices by absorption of freight is legal or illegal. There are some other issues in the cement case, but that is the one regarded by the parties as the cardinal one.

Absorption of freight was defined as occurring when the delivered price is less than the base price at the producing plant plus actual transportation cost to the consuming point.

Big Difference — Former Governor of New York State Nathan L. Miller, counsel for the United States Steel Corp.'s subsidiaries, pointed out that there is a big difference between "phantom freight," which the Supreme Court declared illegal in the glucose cases, and "freight absorption," which issue now is before the court. Phantom freight involves charging more than the base price at the producing plant plus actual cost of transportation to the point of delivery.

"Phantom freight and absorption of freight are as different as day and night, as different as black and white," declared Mr. Miller in his summation.

Counsel for the cement companies contended that the Federal Trade Commission had "fatally" omitted the making of a finding of the most essential element of the case, namely, the existence of a conspiracy or combination to fix prices. They also claimed that there was no evidence from which such a finding could have been made. The government attorneys substantially conceded the lack of such a finding and concentrated largely on endeavoring to show the existence of "abnormal" pricing methods in cement from which the existence of a conspiracy could be inferred. They relied largely on these three points:

1—In numerous bid openings by the government the prices of all cement companies were identical down to one ten-thousandth of a cent per barrel. Under normal competitive conditions, government attorneys held, some of the companies would have quoted lower prices than others to get the business.

2—Cement companies rarely lowered prices to get business in their immediate territories but regularly reduced them when meeting competition farther afield.

3—In a period of several years after the National Recovery Administration was liquidated there was extreme rigidity in the price of cement although the productive capacity of the industry far exceeded the demand.

Are Reductions Illegal — On one occasion Justice Reed asked Walter Wooden of the Federal Trade Commission if the government held that the granting of a reduced price in good faith to meet a competitor's lower delivered price was illegal. Mr. Wooden said he would not contend it was necessarily illegal to meet a lower price in "individual instances." Throughout his argument, however, he advocated that any general system of freight absorption which resulted in the prices of the various producers being identical at each point of delivery was illegal.

Another point of importance brought by cement counsel to the attention of the Court was the dual jurisdiction under which both the Justice Department and the Federal Trade Commission are bringing actions for antitrust law violations. It was pointed out that the Justice Department now is starting action against the cement industry in the Federal District Court at Denver, and is covering the same ground which has been covered during the 10-year Federal Trade Commission action now before the Supreme Court. The only substantial difference, cement counsel pointed out, is that the Justice Department action involves cement pricing up to 1945.

Wasteful Repetition—Such dual jurisdiction, it was pointed out, involves wasteful repetition of effort and the unnecessary expenditure of large sums of money—and prolongs the period of uncertainty in which the particular industry finds itself while under fire by the government. The argument was made that Congress never intended that the Federal Trade Commission should have authority to proceed against alleged combinations in restraint of trade, but that this power was intended exclusively for the Department of Justice.

The implication made by cement counsel was that if this particular argument is not recognized and resolved by the Supreme Court, the evil of dual jurisdiction should be removed by some legislative action of Congress.

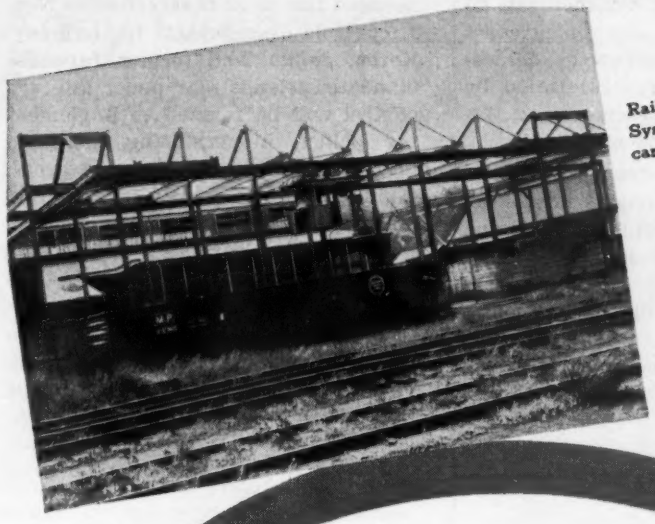
ATOMIC RESEARCH

Dr. E. U. Condon, director of the National Bureau of Standards, has assumed chairmanship of a new bureau, Division of Atomic Physics. It will embrace all the bureau activities in the field of atomic research including spectroscopy, electronics, mass spectrometry, radioactivity, x-rays, and atomic physics. Assistant chief of the new division is Dr. Robert D. Huntoon, former chief of the Electronic Section, Division of Ordnance Development. A leading study will be gathering of basic information about nuclear structure and its relation to the availability of atomic energy; for such work the bureau is constructing, with Office of Naval Research funds, an instrument of unusual and specialized construction.

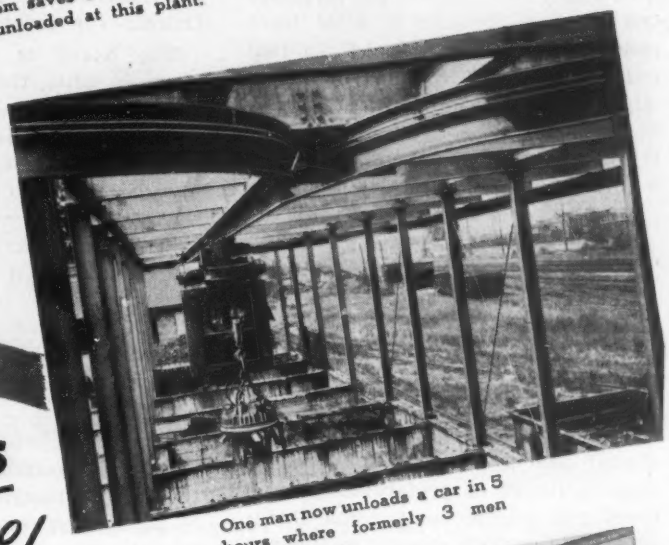
Mobilization Plans Pushed

In view of the continually deteriorating international situation, hardly a week goes by in Washington without some new action somewhere along the line aimed at strengthening our ability to mobilize men and industry quickly in the possible event of another war.

In this category of news is the announcement by Maj. Gen. Lewis B. Hershey, director of the Office of Selective Service Records, that Selective Service board members across the nation are forming "standby" man-



RailMaster 5-Ton MonoRail System saves 31 hours for each car unloaded at this plant.



One man now unloads a car in 5 hours where formerly 3 men took 36 hours.

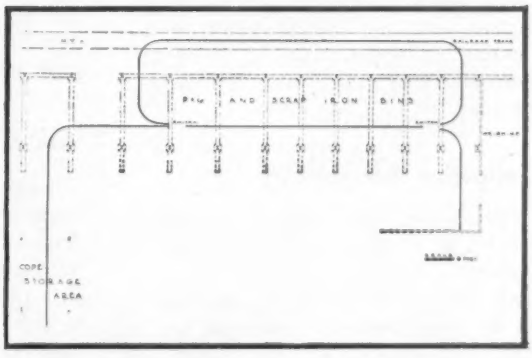
Handling Costs Reduced 86% with AMERICAN MONORAIL

American MonoRail System also used for storing copes and breaking scrap with 1000 lb. steel ball.

At this plant it formerly took 3 men appoximately 36 hours to unload and store a car of pig or scrap iron. With the American Mono-Rail system one man now accomplishes the same job in 5 hours.

The savings in time is just part of the story since the system is used for breaking scrap as well as storing copes.

American MonoRail engineers often prove marked reduction in handling costs. They have hundreds of cases from which to draw. A consultation can be quickly arranged.



SEND FOR BULLETIN C-1. A 56-page book showing successful applications of American MonoRail Systems.

THE AMERICAN MONORAIL COMPANY

13102 ATHENS AVENUE **CLEVELAND 7, OHIO**

power boards. In many of the states veteran draft board members are holding meetings and planning how to meet manpower needs when the need may arise. General Hershey said one possible need might arise from passage of the proposed universal military training act, and another might be "some kind of mobilization." In practically all sections of the country the necessary board setups could be made operative almost overnight.

Action on Housing Front

Federal Housing Administration authorities are getting ready to take action on applications from some 12 manufacturers for FHA insurance of bank loans they are seeking in order to finance housing production. Included are a number of proposed manufacturers of prefabricated steel housing or housing components. Under an act of Congress enacted in July the FHA can guarantee up to 90 per cent of the face value of loans made by private banks to finance housing production. Other companies are preparing to make similar applications as soon as they are in a position to furnish the detailed information that must accompany the applications. Commissioner Walter L. Green is in charge of the program.

Fair Labor Standards

The long-planned hearings of Wage-Hour Administrator William R. McComb to consider revision of exemptions of executive, administrative and professional employees under overtime provisions of the Fair Labor Standards Act are to be held in the Labor Department auditorium, Washington, starting Dec. 2. Parties intending to appear should write the administrator concerning the matter by Nov. 20.

Collective Bargaining

The National Labor Relations Board, in issuing its first orders for collective bargaining elections under Taft-Hartley Act, significantly stated in a press handout that the unions had "complied with the filing and affidavit requirements of the law, so that their petitions could be processed." The elections were asked for after the employers refused to recognize the unions as bargaining agent without a proper certification by the board.

The elections are to determine whether some 300 employees of the Cities Service Oil Co. Marine Division desire to be represented by the Seafarers International Union of North America—AFL, and whether the 25 clerical employees and timekeepers of Art Metal Construction Co., Jamestown, N. Y., want representation by the International Association of Machinists (an independent union).

The board is refusing to order elections when the unions have neglected to file financial statements and anti-communist affidavits signed by proper officials. This policy is swelling the flood of union registrations that started to come to the Labor Department after the board recently overruled General Counsel Robert N. Denham by deciding top CIO and AFL officials need not sign anti-communist affidavits.

Antitrust Suit Filed

Antitrust suit has been brought in the U. S. District Court, Trenton, N. J., against five cast iron pressure pipe producers, charging them with conspiracy to monopolize and restrain trade in the industry by abuse of patent rights and lease-license agreements. The defendants are: United States Pipe & Foundry Co., Burlington, N. J.; James B. Clow & Sons, Chicago; Glamorgan Pipe & Foundry Co., Lynchburg, Va.; Lynchburg Foundry Co., Lynchburg, Va.; and McWane Cast Iron Co., Birmingham.

The complaint charges that unlawful action was carried out through lease-license agreements relating to patents, which resulted in limiting the production, types and dimensions of cast iron pressure pipe, controlling domestic selling prices and maintaining for United States Pipe & Foundry Co. a dominant position in the industry. Attorney General Tom C. Clark said the defendants produce approximately 70 per cent of all cast iron pressure pipe made in this country.

Ask Car Steel Controls

Legislation to give the Office of Defense Transportation two-way controls over freight car construction is reported being drafted by the agency. ODT officials, it is said, want power to allocate needed steel to carmakers and also want an inventory control system so they can make sure this steel is used for freight cars only. The agency, still seeking to boost car output to 10,000 monthly, says some steel allocated to car builders by the steel producers is going into other items.

Exports to Occupied Areas

Department of Commerce and the National Military Establishment announced last week that, effective Nov. 1, controls over exports to Germany, Korea, Japan, and former Japanese mandated islands now under military control will be relaxed to implement the policy of permitting increased private trading with occupied areas. Commodities not on the Positive List may now be shipped to these occupied areas without clearance by the Export Supply Branch, Office of International Trade, Department of Commerce. It was emphasized that import control by occupying authorities will continue to restrict the volume and type of commodities that may be exported to those areas. An authorization to import should be obtained before shipment.

All shipments of commodities on the Positive List will continue to require export licenses issued by OIT. With regard to these items, shipment to U. S. zones of occupation or to the combined U. S.-U. K. zones of Germany will be licensed only on the evidence of import permits issued by the occupation authorities.

Permits Work on Sixth Day

The Department of the Army has rescinded an order issued soon after V-J Day limiting the employment of mechanics and other workers at arsenals and other Army establishments to 40 hours a week. The new order sets a limit of 8 hours' work per day but permits working 6 instead of 5 days a week. Overtime will be paid for the sixth day. The newly permitted working schedule will not be adopted generally, but will be followed in a number of plants on certain jobs that require stepped-up production.

Synthetic Rubber Plentiful

Despite trade rumors to the contrary, no resumption of allocation controls over general purpose synthetic rubber (GRS) is contemplated, according to Earl W. Glen, acting chief, Rubber Division, Office of Materials Distribution. Review of current supply-demand relationships in synthetic rubber indicate sufficient quantities to meet total estimated requirements of the rubber industry will be available from the synthetic facilities which still remain in operation.

Quarterly requirements have been diminishing. Based on the Rubber Division's knowledge of the supply and of industry's requirements and capacity to consume, there does not appear any justification for resumption of allocation control.

Army Ordnance Requirements More Exacting

Materiel that won World War II outmoded. New problems arise from accelerated speeds of transportation

MATERIEL that poured out of American plants to win World War II and that was acclaimed as the finest in the world would not be good enough to insure victory in another conflict. Industry today is being called upon constantly to furnish new materials and products that will keep pace with advancements being made in other fields. These were points developed at a recent meeting of the Army Ordnance Association.

New problems which confront Army ordnance arise principally from the accelerated speeds in all forms of transportation, growing importance of accuracy in all forms, and the extension of atomic physics to mechanics of materials. The maximum useful strength of steel is about 300,000 pounds per sq in. while inter- and intra-atomic forces are believed to be thousands of times that figure.

Speed of Sound—Airplanes are now traveling at speeds approaching that of sound (if they have not already passed that limit in secret runs), making increasingly important a reduction of weight of many types of material. Development of higher-strength steel alloys or use of light-weight structural materials, such as aluminum and magnesium, may be a possible solution of this problem.

At the same time, development of light-weight alloys with improved resistance and better corrosion resistance would make possible their use in fabricating suspension and track components and other structural members of tanks not employed for protection from gun fire.

Demands Varied—Army ordnance also needs metals that will maintain their strength and resistance to impact in a wide range of temperatures represented at one extreme by the cold of the Arctic and at the other end by the flame of the rocket or jet. It needs metals which will resist the erosion in guns, as well as metals with the hardness of the diamond and the resiliency of rubber as armor to ward off projectiles.

Generally speaking, the projectile is now ahead in its battle with armor to gain dominance. Armor that is impenetrable yet light must be devised so that the equipment will not be immobilized by sheer weight.

The most profitable balance must be struck between light projectile weight to obtain high velocity and heavy projectile weight to obtain a large payload. Since velocities have increased amazingly in the last few years, and there appears little limit to their extension except that of materials, the choice of materials for high-velocity projectors which will withstand sufficient use to justify the investment in the gun is a major problem.

DIESEL ASSEMBLY LINE: An assembly line installed in the Superior Engine Division plant of National Supply Co., Springfield, O., allows 15 medium and slow speed diesel engines to move down the line at the same time (lower photograph) in place of the five engines which were formerly assembled part by part in the same space (upper photograph). At end of line the last part, cylinder head cover, is put on engine which moves to the test stand. After test approval and painting, it is loaded aboard a flat car for shipment

Harvester Company Establishes Manufacturing Research Center

New $3.5 million department intended to provide climate for development of improved manufacturing techniques. Laboratory segregated from other company research and from manufacturing activities, although co-ordinated with both

TO DEVELOP improved manufacturing techniques, International Harvester Co., Chicago, is segregating manufacturing research from other Harvester operations in a new department.

The manufacturing research department has been in the process of being established for more than a year but was dedicated only two weeks ago. Already it is beginning to pay off in benefits from new ideas.

The department is housed in a 230,000-sq ft building acquired from the federal government at 5225 S. Western avenue, Chicago. International Harvester has expended $3.5 million in buying and equipping the building and now has about 235 people at work in it. By late 1948, when full operation of the department is reached, employment will be between 400 and 500.

Objectives—Objectives of the new department are: (1) Investigation of company manufacturing methods and problems; (2) development of manufacturing standards; (3) keeping abreast of all developments in the manufacturing field.

The department also will share with other Harvester departments such objectives as increasing the utility of products, improving quality of products, developing new processes, materials and products, reducing product cost as well as operating and maintenance costs, standardizing methods, collecting technical information and contributing to the general store of technical knowledge.

Economies Sought — Investigative activities will be projected along two general lines. First, the manufacturing research department will seek the most economical method of manufacture for products already in production in the manufacturing lines. Second, it will seek the most economical method of manufacturing new or improved products coming into the line from design engineering groups.

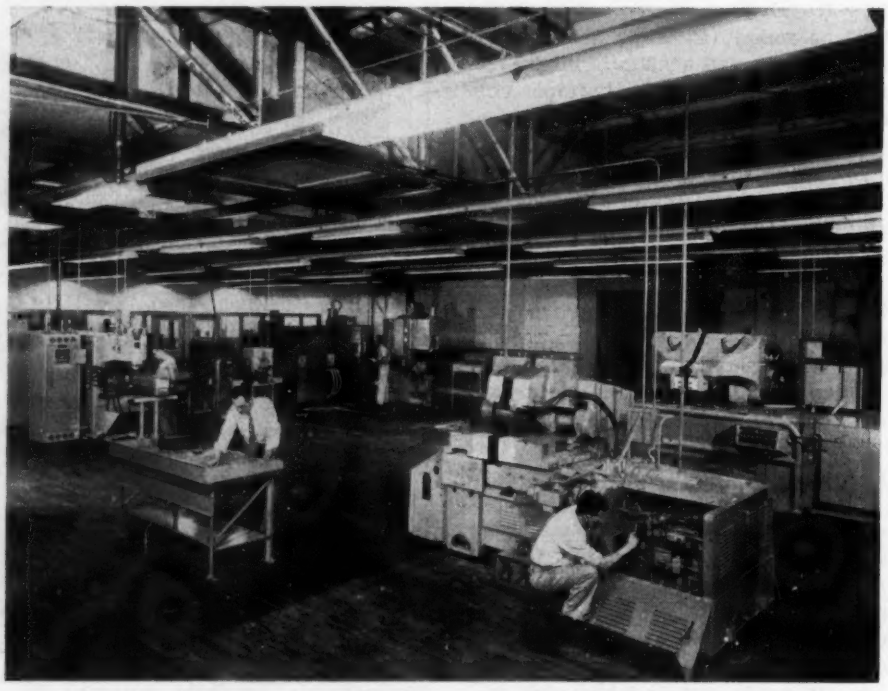
Objective contemplated by the development of manufacturing standards has as its goal more than the mere accumulation of data showing the best and most economical method of manufacturing. The data accumulated through research will be classified and codified. They will be presented in a form which can be made available to all company manufacturing operations. The standard will thus become a method of establishing uniformity of practice and method from plant to plant within the Harvester company wherever that is desirable.

Third major specific objective, keeping abreast of all developments in the manufacturing world, is a measure to insure that advances in manufacturing techniques by others outside the company do not escape the notice of those within the company charged with the responsibility of producing the best possible product at the lowest possible cost.

Source of Projects—Projects undertaken by the manufacturing research department originate from three main sources: (1) The Harvester organization as a whole. These may come from sales departments within the company in the form of customer suggestions, complaints, etc; Harvester manufacturing plants; other research groups within the company. (2) The manufacturing research department itself proposes projects when it sees opportunities for improvements. (3) Ideas and problems are projected by other industries, in technical literature, by schools and universities and other research organizations.

Administration of the new unit and research activities in the new department are under the direction of M. C. Evans, manager of manufacturing research. Mr. Evans, a veteran of 28 years' service with the company, has spent most of his career in Harvester's manufacturing operations. Prior to his current assignment he was manager of all the company's tractor manufacturing plants in the United States. Operating head of the new department is J. W. Armour, assistant manager of manufacturing research.

Heads of subdivisions and other key men in the organization have been recruited from various Harvester operations. All have had many years of manufacturing experience. They were selected on the basis of their qualifications for and their adaptability to research work. Most of the research staff members are graduate



Research engineers and technicians are shown at work in the resistance welding section of International Harvester Co.'s new manufacturing research department. Technician in center background is checking a flexible resistance welding timing system, centrally located with connections running to nine resistance welders. The system uses 6½ miles of wire and makes three weld timers of the latest design available for use with any of the resistance welders in the laboratory

scientists. Many of the laboratory employees are technicians with experience in laboratory techniques.

Subdivisions Named—Major subdivisions of the manufacturing research department are: Administrative, plant engineering, mechanical engineering, materials handling and product protection, welding, metallurgical, protective finishes, inspection, forging, foundry and manufacturing standards sections.

Each section has its own supervising head. Each also has a research staff and a group of technicians. Every section has been allotted space in the new department in accordance with its requirements and full-scale research laboratories have been established where necessary. The sections are organized in such a way that they may approach projects assigned to them independently of the other sections. Where projects are of such magnitude, or the character of the problem requires co-operation between two, more, or all of the sections, a collaborative scheme has been worked out. Under this plan one section assumes responsibility for the entire research project but may call upon other sections for assistance.

The manufacturing research department is not a self-sufficient unit in the sense that it has at its disposal all the equipment and facilities necessary to consummate every project it undertakes. It will not maintain facilities at the manufacturing research building where the type, size and cost of duplicating those facilities within the company would be out of proportion to the research yield.

Forging Research — The research department, for example, will not have a forge shop. However, a forging section has been established with a research staff and group which has its headquarters in the manufacturing research building.

Galvanizers Slate Meeting For Baltimore, Nov. 20-22

Fall meeting of the Galvanizers Committee, sponsored by American Zinc Institute, will be held at Lord Baltimore Hotel, Baltimore, Nov. 20-22. According to Nelson E. Cook, chairman of the governing board, highlight of the meeting will be an inspection trip to the Rheem Mfg. Co. and Bethlehem Steel Co. at Sparrows Point.

New developments and operating techniques will feature forums and discussions. At the close of the meeting successors will be named to fill the places of the two retiring members of the governing board which now consists of: N. E. Cook, Wheeling Steel Corp., Wheeling, W. Va.; F. E. Aloi, Bethlehem Steel Co., Bethlehem, Pa.; R. A. Atkins, Niles Rolling Mill Co., Niles, O.; F. W. Brown, Inland Steel Co., Chicago; J. J. Enlow, Lysaght Dominion Sheet Metal Corp., Hamilton, Ont.; B. P. Finkbone, American Rolling Mill Co., Middletown, O.; and C. H. Steele, Steel Co. of Canada Ltd., Hamilton, Ont.

Steel Constructors Gather In Miami Beach Nov. 10-13

American Institute of Steel Construction will hold its annual convention Nov. 10-13 at Roney Plaza Hotel in Miami Beach, Fla. Speakers for the event include Murray Shields, vice president of Bank of Manhattan Co., New York, who discusses "Some Guideposts for Business Planning in 1948"; Herman H. Lind, president of American Institute of Bolt, Nut & Rivet Manufacturers, Cleveland, whose topic is "Fasteners for the Fabricating Industry"; and Douglas Whitlock, chairman of Building Products Institute, Washington, who will address the gathering on "The Building Industry—Present and Future."

The program will also feature an engineering symposium and election of new directors.

Materials Handling Section Of ASME Meets Jan. 13-14

A special national session of the materials handling and management divisions of the American Society of Mechanical Engineers will be held in Cleveland at the Hotel Statler on Jan. 13-14 in connection with the Second National Materials Handling Exposition scheduled for Cleveland's Public Auditorium, Jan. 12-16.

Gray Iron Research Group Names D. E. Krause Director

As a step to bring closer liaison between its laboratory research at Battelle Memorial Institute, Columbus, O., and its affiliate foundries, Gray Iron Research Institute has named Daniel E. Krause its executive director. Mr. Krause will set up a central office for GIRI in Columbus and will supervise the organization's plant service work and publications and have general charge of the administration of its research.

Mr. Krause has had 15 years' service with Battelle and has also been associated with GIRI since its organization in 1939.

Johns-Manville Opens Unit of Research Center

Firm dedicates first building of center at Manville, N. J., which is to consist of five more units

FIRST big laboratory and pilot plant building of the research center it is erecting on the Raritan river near Manville, N. J., was displayed last week by Johns-Manville Corp., New York, to a group of scientists, research directors from other companies, editors and writers.

This project will soon house the world's largest laboratories devoted to building materials, insulations and allied industrial projects. The research center will ultimately be composed of five or six buildings, having a total of 337,000 sq ft of floor space. The second building is now under construction and is scheduled for completion by May, 1948.

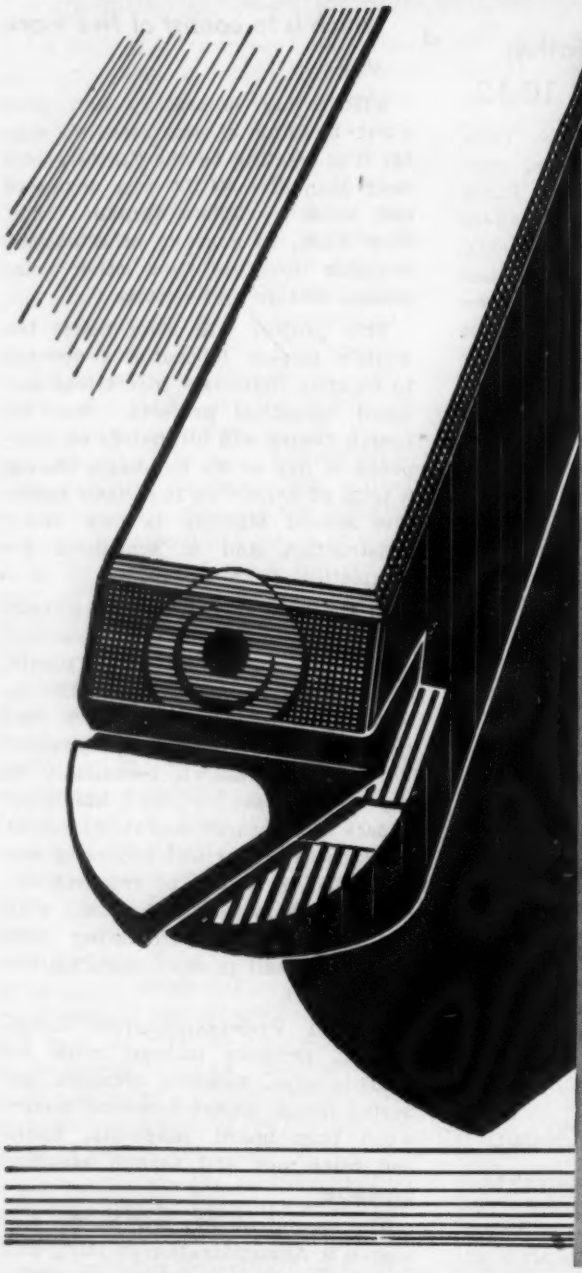
In the new two-story unit already in operation for product research and development, 10 pilot plants, each directly connected with its own special laboratory, are engaged in experimental production. The building, known technically as the "wet semi-works building," houses all research and development projects involving wet processes and is staffed by teams of research engineers and factory technicians with the purpose of co-ordinating both production and product research under one roof.

Current Projects—Current development projects include work on transite pipe, asbestos shingles, asbestos fibres, asbestos-cement board, wood pulp board, magnesia, fillers and filter aids and asphalt building products.

The second facility will be the Research & Administration building and will house the analytical chemists, organic chemists, physicists, acoustical engineers, materials testing, administrative force and executive offices.

As the new units of the center, to be under the direction of Earl R. Williams, are completed, research activities still operating in the old laboratories at the firm's Manville plant will be transferred. The present research force of about 420 will be increased ultimately under long-range plans.

QUIZ ON HIGH SPEED STEELS



Q. How long have molybdenum high speed steels been used successfully?

A. For about 15 years.

Q. Why are molybdenum high speed steels preferred to 18-4-1 by many large consumers of tool steels?

A. They're tougher. Do a better job for less money. They're from 10¢ to 20¢ a pound cheaper. In addition, the molybdenum steels have from 6% to 9% lower density, so if you make your own tools, you get more tools for a given gross weight.*

Q. Where are users finding molybdenum high speed tool steels superior?

A. In twist drills. In hacksaw blades. In milling, slotting, and slitting saws. In taps, chasers, broaches, reamers, hobs, milling cutters, lathe and planer tools. Can be used for all classes of high speed tools with good results.

Q. Is there any special trick needed in heat treating molybdenum high speed tool steels?

A. No. In modern furnaces, molybdenum high speed tool steels are as easy to harden properly as 18-4-1. *And* they cost much less—and *save money on the job.*

**Our booklet on molybdenum high speed steels will give you proof of these statements. Write for it.*

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MOLY

By A. H. ALLEN *Detroit Editor, STEEL*

Mirrors of Motordom

New Hudson model brings cheer from distributors at preview. Car is only 60 in. high but provides adequate headroom, leg room and road clearance. Passengers step down to enter. Rear seats are entirely ahead of rear wheels

DETROIT

THE "new look" in motor cars is definitely wrapped up in the 1948 Hudson, which drew prolonged cheers from the company's 150 distributors who got a peek at it last week. No copy of Studebaker, Packard or Kaiser-Frazer, the "monobilt" Hudson reflects designers' deft touches which will give all the rest of the industry pause for contemplation, and marks the greatest break from tradition which this manufacturer has ever undertaken—and at a cost of $16 million, incidentally.

Integration of body and frame is not a new idea in the motor industry, but Hudson has carried it somewhat further than Nash and Lincoln, for example. The old type of side-rail and X-member frame has been discarded completely in favor of a skeleton framework of box-section strip steel, spot welded to floor pan and body sheet metal to form a rugged, low and compact assembly. Beneath the floor pan, made up of three embossed stampings welded together, is a series of eight transverse box-section members and four longitudinal members on each side, splitting at the rear to extend inside and outside the wheel housings. Engine is supported on a box-section subframe assembly, welded and bolted to the main base frame.

Extending upward from the base members are door pillars, transverse pieces, and angular support sections from the cowl down to the engine platform. On this stiff tubular type of frame are hung the outer sheet metal sections — hood, doors, side panels, roof, rear deck, etc.—and the entire unit is lowered on the chassis which comprises only wheels, suspension units — coils in front, leaf springs at the rear—engine, transmission, driveshaft and differential.

Five Feet High—Result is a car which is only 60 in. high, yet has all the headroom, legroom and road clearance of most passenger vehicles today. Front seat, for example, is 64 in. wide, rear seat 63 in. To enter car, the passenger steps down about 5 in. over the frame sill and onto the floor. Rear seats are entirely ahead of the rear wheels, which, together with the low center of gravity, provides what is described as a pleasantly new type of ride sensation.

It is difficult to convey in this sketchy description a full appreciation of the changes which designers and engineers have worked in the new Hudson. Public announcement and full technical details are being withheld until all dealers have been sampled with at least one car which will probably require another month of production. Thus far output has been confined to several hundred units, since the technique of manufacture is new and it takes time to train supervisors and workers in a radically new type of assembly method and sequence.

Two Basic Models—The car will be built in two basic models, either of which may be had with a 6 or 8-cylinder engine. Horsepower of power plants has been stepped up appreciably, the six for example delivering 121 hp at 4000 r.p.m. The two series will be called the Commodore and the Super, and in all there will be available about 10 body styles, plus two convertibles and pickup trucks. It is hoped to have the full line rolling by Dec. 22.

So much for the new Hudson, except to add that the company's tempo of sales promotion seems to have been infused with an enthusiasm not equaled in years, paced by the catchy slogan, "This time it's Hudson."

More New Models Coming—Perhaps the news of this brand new model has touched off reports of other manufacturers' plans, or possibly there is developing a feeling that the public needs a shot in the arm on what is coming in motordom. To listen to sales officials' reports of order backlogs and the apparently incessant demand for cars, this sounds like so much poppycock, yet the talk on new models is building up. Ford says it will have something to say about 1948 models shortly, involving principally an assembly line change, not the "radically new" Ford which has been in the development stage so long but will not be in production before spring. Nash will unveil its 1948 models next month, which will be featured mainly by minor decorative changes. Likewise Studebaker dealers have been notified that 1948 models are being prepared for public introduction next month, and manufacturing changes will involve practically no loss in production. They will represent the first changes made by the South Bend producer since May, 1946. Pontiac officials have dribbled out the news they will change over to 1948 models in January, and the first of the new series will come right on the heels of the last of the 1947s, inferring only minor styling changes.

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

Estimates by Ward's Automotive Reports

	1947	1946
January	373,872	126,082
February	399,717	84,109
March	441,798	140,738
April	449,388	248,108
May	390,629	247,620
June	418,919	216,637
July	396,932	331,100
August	360,221	359,111
September	452,068*	342,969
October		410,510
November		380,664
December		380,908
12 mos.		3,268,456

* Preliminary.

Estimates for week ended:

Oct. 11	98,978	86,330
Oct. 18	89,180	89,540
Oct. 25	105,587	87,680
Nov. 1	107,000	95,427

Production Moves Up

Meanwhile current production is firming for a strong dash to the year-end finish line. Weekly assemblies of cars and trucks have moved back across the 100,000 mark, and October may show a new high for the year. If the 5,000,000 mark is to be cleared this year, weekly production will need to average 108,000, and this seems doubtful of achievement in view of the Thanksgiving and Christmas holidays, plus some inventory-taking plans which will

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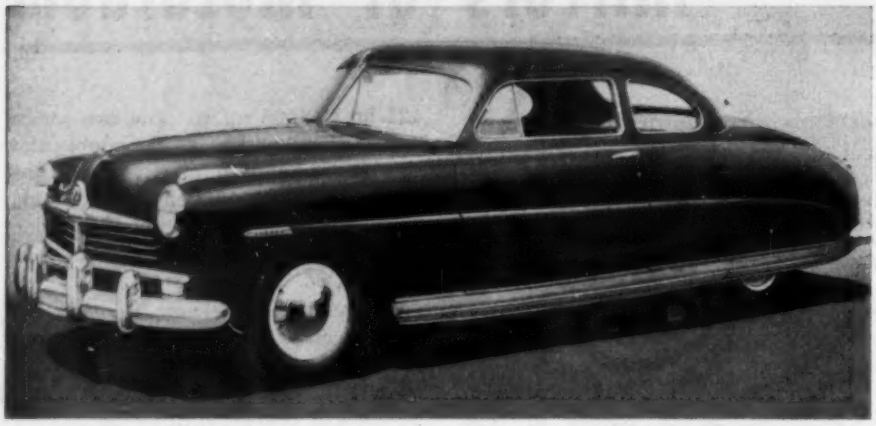

Hudson's new models are moving out of the company's plants at Detroit and are being sent to dealers for display. Shown above is the Commodore Eight 6-passenger coupe. Only 5 ft from ground to top, the car has a low center of gravity, yet provides plenty of headroom

mature toward the end of the year. At any rate, assemblies will come mighty close to the goal, and next year should see it exceeded by a wide margin. On the present outlook, 1948 could easily be the greatest year the automotive industry has ever known.

Oldsmobile has reached the 150,000-mark in its 1947 production and, barring another sag in steel supplies, will finish the year close to 200,000. At this date last year, Olds had built only about 75,000 units, concluding the year with 119,328. However, the total this year falls considerably short of the 1941 model year when 270,058 units were assembled. Average daily schedule this month is 750, including export and assemblies at Kansas City, Kans., Southgate, Calif., and Linden, N. J. The home plant at Lansing, Mich., is turning out 55 cars an hour. Eighty-five per cent of the Olds cars built this year have been equipped with Hydra-Matic drive, first introduced in 1940 and since made available on Cadillac as well. More than 400,000 of these transmission units have been manufactured thus far, and plans are for Pontiac to make the unit available in 1948 on about 50 per cent of its production.

Buys Forging Plant

Final details of the purchase by Ford Motor Co. of a government-owned forging plant at Canton, O., have been disclosed, and point to a further decentralization of Ford operations away from the Rouge plant here. The Canton plant provides 180,000 sq ft of manufacturing space and will be a self-contained unit under the direction of Harry G. Howell, who comes to Ford from the Tube Turns Division of the Girdler Corp. at Louisville, Ky., where he served as vice president in charge of production.

The plant, operated by Republic Steel during the war to produce gun forgings, will be converted by Ford to produce about 1,000,000 lb of forgings daily for automobiles, trucks and tractors. Part of the work now scheduled in the Ford Rouge spring and upset building will be transferred to Ohio, releasing space for added pressed steel operations and storage of body parts. Sidings, loading docks and new production and materials handling equipment will be installed at Canton, as soon as materials now stored in the plant can be removed. Equipment will include steam hammers, upsetters, forging presses, shotblasting machines and heat treating furnaces. About 100 major parts will be produced there, including principally gear and axle components. A tool and die shop will be an integral part of the plant, and overall employment will run to about 1000.

Ford Finances

For the first time on record, Ford has officially released figures on its financial record. For 1946, capital stock and surplus decreased a little better than $14 million. Net working capital decreased by almost $45 million, and total current assets as of Dec. 31, 1946, were better than $523 million, including nearly $180 million worth of inventories, up $78 million from a year previous.

Fisher Buys Ohio Plant

Fisher Body Division of General Motors has acquired a plant at Euclid, O., near Cleveland, operated during the war by Cleveland Pneumatic Aerol Inc., and subsequently sold to Harry Ferguson Inc. When Ferguson abandoned plans for tractor production in this country, after severing connection with Ford, he relinquished the facility to Fisher Body for a reported $2 million. Fisher will use the 700,000 sq ft of space to expand its production of station wagon bodies and panel delivery truck bodies, now being handled at the Cleveland Fisher plant which has been found to be inadequate for contemplated increased production. Output will start in the new plant some time next spring.

Tucker Reports

Full-page newspaper advertisements in metropolitan Sunday editions recently informed an avid public that maple body forms (patterns) for body dies for the new Tucker automobile had been completed in a mere 100 days and released to Hayes Mfg. Corp., Grand Rapids, Mich., which will produce body dies and stampings. Mr. Tucker says he hopes to start receiving stampings by Christmas on an initial lot of 25 cars so they can be completed by the first of the year. Sixty days is a pretty short time to complete complicated body dies and run off stampings from them. Detroit usually figures about six months for such a project. Mr. Tucker also indicates he has made commitments for body steel and has been assured of tonnage when he is ready for it. However, in answer to telephone inquiries from STEEL, neither company officials nor the public relations counsel cared to elaborate on this statement. Tucker further deposes he has been considering the purchase of a steel plant to insure a steady supply of sheet steel as he moves his production toward 1000 per day.

Mr. Tucker has announced that he will exercise his option to buy the former Dodge-Chicago aircraft engine plant and some machinery now in the plant for about $40 million, to be paid over a 20-year period.

Harold H. Budds, former vice president of Fairchild Engine & Airplane Co., and one-time head of the Briggs Mfg. Co. Aircraft Division in Detroit, has been named executive consultant to the president and co-ordinator of engineering and production for Tucker. Other new officials include N. W. Dulian, sales manager, formerly with Studebaker and Buick, and John L. Ballard, director of distribution, formerly with Ford, GM and DeSoto.

INTRICACY IS NO PROBLEM

In designing die castings the goal should be simplicity —in the sense that all non-essentials are eliminated— but complexity of shape can be a definite advantage if it results in overall production economies. For example, consider the motion picture projector housing here illustrated. *This is a one-piece zinc alloy die casting.*

Any other method of production for this housing would have entailed either a built-up assembly of a number of parts or exorbitant machining costs. As a die casting, the holes, recesses, bosses and intricate contours are achieved in a single operation and very little additional work beyond trimming is required prior to the application of a decorative finish. The obvious savings in machining and assembling easily compensate for the extra tooling costs and slower casting speeds involved in die casting a piece of such complexity.

In die casting there is no scrap loss and, since the average wall thickness of this housing is not much over 1/16", an absolute minimum of metal is consumed. An additional advantage is the smooth as-cast surfaces which facilitate the application of a handsome wrinkle lacquer finish.

ALLOY SELECTION

Good die casting design is of no avail unless the proper alloy is selected. Furthermore, it is imperative that any alloy used in die casting production be carefully formulated with respect to every element involved to insure maximum mechanical properties and dimensional stability. If a zinc alloy is used, your die caster should provide one of those shown in the table below. These alloys are covered by specifications of the American Society for Testing Materials and the Society of Automotive Engineers.

Composition of Zinc Alloys For Die Castings

Composition* % by Weight	ZAMAK†-3 A.S.T.M.-XXIII S.A.E.-903	ZAMAK†-5 A.S.T.M.-XXV S.A.E.-925
Copper	.10 Max.	.75 to 1.25
Aluminum	3.5 to 4.3	3.5 to 4.3
Magnesium	.03 to .08	.03 to .08
Iron, Max.	.100	.100
Lead, Max.	.007	.007
Cadmium, Max.	.005	.005
Tin, Max.	.005	.005
Zinc	Remainder	Remainder

*Composition as provided in A.S.T.M. and S.A.E. Specifications. The Zamak alloys meet these specifications but are held within closer limits as to composition.

† A trade mark (registered in the U. S. Patent Office) identifying the zinc alloys developed by The New Jersey Zinc Company and used in the die casting industry.

For additional data on die casting design ask us—or your die casting source—for a copy of the booklet "Designing For Die Casting".

Send for your copy ➡

ZINC

FOR DIE CASTING ALLOYS

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The Research was done, the Alloys were developed, and most Die Castings are based on

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Lone Star Seeks To Buy Leased Blast Furnace

With Kaiser-Frazer and Ford to get part of Daingerfield pig iron output, lessee plans outright purchase of facility

DALLAS, TEX.

FOLLOWING announcements that Kaiser-Frazer Corp. and Ford Motor Co. have contracted for a portion of the pig iron output of the government-built Daingerfield, Tex., blast furnace, Lone Star Steel Co. has revealed it is seeking to purchase outright the $35 million facility which it now leases from the government with option to buy within three years.

Initial tapping of the blast furnace was scheduled for late last week. Output of 700 tons of pig iron daily is expected. Rated capacity is 1000 tons daily.

E. B. Germany, president of Lone Star, called a meeting of stockholders on Oct. 31 to consider issuance of additional stock and also debentures to effect the purchase.

Kaizer-Frazer, it was disclosed, would be interested in buying part of this additional stock. The automobile company has deposited $500,000 as advance payment on delivery of 7 per cent of the pig iron to be produced at the blast furnace. Ford has made a similar agreement for 14 per cent of the total prospective pig iron output over a period extending through May, 1948.

Large Advance Payment — Lone Star must pay $1 million in advance to War Assets Administration to exercise its option to purchase the property. The proposal of its finance committee is that 666,666 additional shares be sold at a recommended price of $1.50 per share in order to provide that cash. In addition, the stockholders will be submitted a proposal to authorize $1,500,000 in debentures, bearing 3 1/2 per cent interest, to supplant an RFC loan at 4 per cent interest for a similar amount which was obtained as initial operating capital.

Sharon Considers Expansion Which May Cost $25 Million

Sharon Steel Corp., Sharon, Pa., is considering a long-range expansion program which may eventually cost from $15 to $25 million. This was revealed as President-Chairman Henry A. Roemer disclosed details of a $4,500,000 expansion program now under way. The long-range project includes the eventual construction of another blast furnace at its Farrell Works and possibly an oven foundry coke plant to be built either at Farrell or near coal mines.

Current program includes: Enlargement of 14 open hearths at Farrell to 135-ton units; changing the Lowellville works to a specialty steel plant; installation of a 14-in. mill and modernizing the continuous mill and 10-in. and 8-in. units to boost annual hot rolled capacity to 800,000 tons; increasing cold rolled capacity by 36,000 tons yearly with a 4-high reversing cold mill now being built by United Engineering & Foundry Co.; installation of three McKay electric weld tube mills.

In addition, Sharon has modernized plants of two of its subsidiaries, Bopp Steel Corp. and Detroit Seamless Tubes Co., in Detroit and has consolidated the pair as Detroit Steel & Tubes Co.

SEE WIRE FABRICATION: Nearly 8000 visitors inspected the plant of Copperweld Steel Co. during its recent open house. Here a group watches fabrication of a wire product on a high-speed machine

Output of Westinghouse Turbine Generators Doubles

To help meet an all-time record demand for electric power, Westinghouse Electric Corp. is turning out steam turbine generating equipment at a rate nearly double that of any previous year, Gwilym A. Price, president, has reported. Westinghouse expects to continue this rate of production of generating equipment through 1950.

Production of associated electrical equipment is also at a new high. Output of distribution transformers is running at a rate twice that of 1941, and meter production at a rate better than 50 per cent above that year.

Industrial users came out of the war with a need for 74 per cent more electricity than in 1939.

To meet the mounting demand for electricity, there is under way in the United States, says Mr. Price, the largest electric power expansion program ever attempted anywhere in the world. By 1951 the nation's generating capacity will be increased by almost 20 million kilowatts, or 40 per cent.

Locomotive Firm's 1948 Output To Fill Old Orders

Its order backlog of more than $70 million will take up the entire production schedule of American Locomotive Co., New York, through 1948, according to Duncan W. Fraser, chairman.

Company now is completing a $20 million modernization and improvement program at its Schenectady, N. Y., plants where production is being shifted predominantly to diesel locomotives.

Electro-Motive Division Boosts Output Two-Thirds

In celebration of the 25th anniversary of its Electro-Motive Division, General Motors Corp. last week announced that the division at LaGrange, Ill., has increased its production to four main-line locomotives and one switching locomotive per working day. This is a 67 per cent increase over production a year ago.

BRIEFS . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Manning, Maxwell & Moore Inc., Bridgeport, Conn., maker of valves, jet apparatus, industrial instruments and cranes and hoists, has taken a long-term lease on a factory in Stratford, Conn., where the firm's Ashcroft gage line will be manufactured.

—o—

Youngstown Steel Door Co., Youngstown, has begun manufacture on an experimental basis of railroad car doors and sides made of aluminum.

—o—

Dawson Machinery Co., manufacturer of tool room and production machinery, has moved its offices to Lincoln Bank Bldg., Syracuse, N. Y.

—o—

General Bronze Corp., Long Island City, N. Y., manufacturer of ornamental and miscellaneous metalwork, has moved its eastern division to a new plant at Stewart Ave., Garden City, L. I., N. Y.

—o—

Chris Craft Corp., Algomac, Mich., builder of utility boats, yachts and cruisers, has permanently closed and will sell its Jamestown, N. Y., plant. Employees at the facility struck Sept. 25 and have not returned.

—o—

Syntron Co., Homer City, Pa., manufacturer of materials handling, construction and maintenance equipment, has established a branch sales office at 4695 Sherbrooke St. W., Montreal, Que., Canada, under direction of C. F. A. Gray.

—o—

Blaw-Knox Co., Pittsburgh, has sold for an undisclosed sum the plant it formerly operated at Martins Ferry, O. Purchaser was Louis Berkman, president of Parkersburg Steel Co., Parkersburg, W. Va.; Louis Berkman Co., Steubenville, O.; and Steel Service Inc., also of Steubenville.

—o—

Parker Appliance Co., Cleveland, has licensed two Los Angeles firms, Pacific Screw Products Corp. and Deutsch Co., to manufacture and sell flared-tube couplings embodying Parker patents.

—o—

Allegheny Ludlum Steel Corp., Brackenridge, Pa., will produce stainless steel wire in the plant which it operated at Dunkirk, N Y., for the government and which it purchased recently for $1,500,000.

—o—

Carboloy Co. Inc., Detroit, has named George W. Hubbard Hardware Co., Flint, Mich., as a distributor.

—o—

Fairchild Engine & Airplane Corp., New York, has licensed National Bronze & Aluminum Co., Cleveland, to use the A1-Fin process for bonding aluminum or its alloys to steel and iron.

—o—

Follansbee Steel Corp., Follansbee, W. Va., has liberalized insurance benefits to employees. Major change was an increase to $3000 for the amount allowed for total permanent disability of production and maintenance employees.

—o—

American Engineering Co., Philadelphia, subsidiary of Hayes Mfg. Corp., has licensed John Thompson Pty. Ltd., Melbourne, Australia, to build and market American's Perfect Spread stokers in that country.

—o—

Shanafelt Mfg. Co., Canton, O., maker of foundry products, has moved into its new plant at 2623 Winfield Way N. E.

—o—

Budd Co., Philadelphia, is making available to railroads and industrial organizations its research laboratories, test facilities and engineering personnel under the direction of Gen. G. M. Barnes. Offer applies to small as well as major projects.

—o—

Shelley Steel Corp., Chicago, has bought for $60,000 a two-story warehouse at 1379 N. Branch St., Chicago, and will move to the new location early this month. Firm is spending about $40,000 in modernizing the property.

—o—

Buffalo Scale Co. Inc. has purchased from McCallum Bronze Co. Inc. its No. 2 plant at 46 Letchworth St., Buffalo, for expanded production of heavy duty scales.

—o—

Los Angeles reports that ocean trade through its port during the first half of this year amounted to $207,016,121, compared with $86,885,988 during the last half of 1946.

—o—

Steel Joist Institute, Washington, on Oct. 15 moved its offices from 3709 24th St. N. E. to the Ring Bldg., 1200 18th St. N. W.

—o—

Radio Receptor Co. Inc., New York, plans to double its production of selenium rectifiers as result of recent purchase of production equipment from a former rectifier manufacturer.

—o—

Fafnir Bearing Co., New Britain, Conn., manufacturer of many types of bearings and a complete line of ball bearing transmission equipment, has created annual scholarships to Yale University for sons of employees of the company, given in memory of the late Elisha H. Cooper who for 20 years was chairman of the firm. Each scholarship is valued up to $1000 a year and is to be used toward expenses of the recipient in an engineering course.

—o—

Caterpillar Tractor Co., Peoria, Ill., plans to build a new plant in Peoria for manufacture of earthmoving equipment.

—o—

United States Scientific Export Association, composed of manufacturers and exporters of scientific equipment, has received a revolving credit of $2,500,000 from the Export-Import Bank to assist the organization to extend credit to its foreign customers.

—o—

Hotpoint Inc., Chicago, has introduced two additional conventional washer models to retail for $119.75 and $129.75, respectively.

—o—

United States Rubber Co., New York, reports a survey party for purposes of appraisal was permitted last month for the first time since the war to enter the company's rubber plantations in Sumatra. Property was occupied by the Japanese in 1942 and was written off as a war loss in that year.

—o—

Advance Paint Co., Indianapolis, manufacturer of industrial finishes, plans to move into its newly-acquired and constructed property at Indianapolis early in 1948. The $1 million expansion program is designed to increase the firm's productive capacity six-fold.

—o—

Rockwell Engineering Co., Chicago, specializing in steel fabricating, forging, machining and welding, is completing construction of a new plant at 13500 S. Western Ave., Blue Island, Ill.

—o—

David Brown & Sons Ltd., Huddersfield, England, has purchased goodwill, designs and work-in-progress of Lagonda Ltd., automobile manufacturer. Lagonda had ceased operations previously as a result of materials shortages and heavy taxation.

The Business Trend

Postwar High Achieved By Industrial Activity

BOUNDING upward three points to establish a new postwar record, STEEL's industrial production index at 167 per cent (preliminary) of the 1936-1939 weekly average reflects near-peak operations in all basic industries during the week ended Oct. 25.

AUTOS—Total production of automobiles and trucks in the United States and Canada, which was held below the 100,000-unit level for two weeks by a shortage of sheet steel, pushed up to 105,587 units in the week ended Oct. 25, with all builders approaching postwar peak operating levels. In the latest week the industry built its four millionth vehicle and turned out its millionth truck for the year.

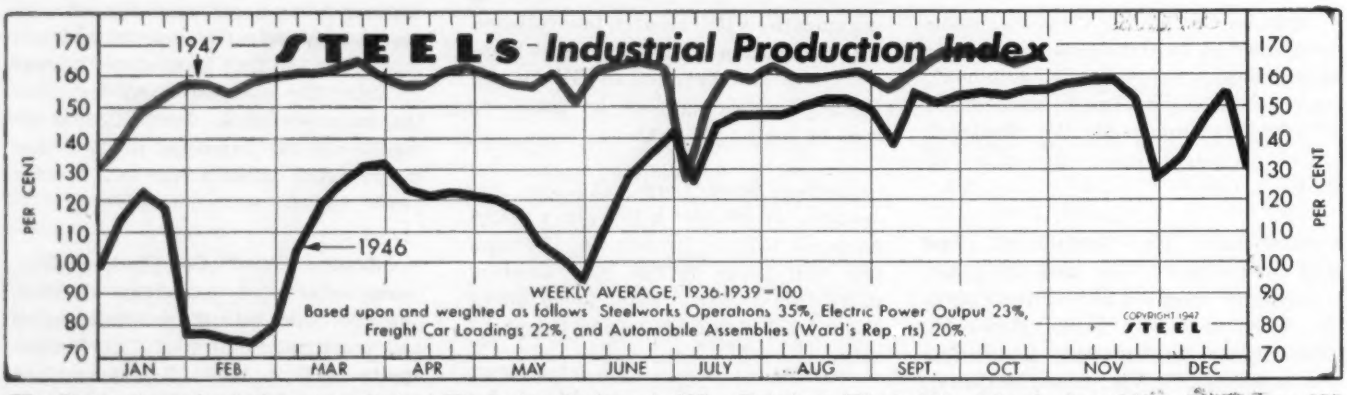
STEEL—Fractional easing of steelmaking operations due largely to suspensions for repairs brought the national rate for the week ended Oct. 25 to 95.5 per cent of capacity.

PRODUCTION—A three-point advance in the Federal Reserve Board's index of industrial production in September raised its figure to 185 per cent of the 1935-1939 average, only 5 points below the postwar monthly peak reached last March. Durable goods production showed the sharpest increase due mainly to greater output of steel, most types of machinery and transportation equipment. Mineral output was also up during the month, the board reporting a new record rate of crude petroleum production and a substantial gain in the tonnage of coal mined. The rise in output of fuels continued into the early part of October under pressure of extremely heavy demand from all directions.

COAL LOADINGS—Volume of coal loadings this year will surpass that during all years back to 1929 with the exception of 1944, when a record 620 million tons of coal were loaded. This prediction by the Association of American Railroads is based on figures to Oct. 4 for the previous 40-week period in which 6,866,479 revenue coal cars had been loaded. This was 12.1 per cent greater than in the comparable period of 1946, 6.7 per cent above the first 40 weeks of 1945 and only 1.2 per cent below the like period of 1944.

PRICES—Slightly lower food prices in the week ended Oct. 18 reduced the Bureau of Labor Statistics wholesale price index 0.1 per cent to 157.9 per cent of the 1926 average. Manufactured goods prices showed a slight easing of 0.4 per cent. Industrial raw materials, however, continued their upward climb, gaining 0.6 per cent from the previous week.

BUYING—Consumer spending is not likely to show a decrease in 1948, the Bureau of Agricultural Economics predicts. It points out that housing and important hard goods are still in short supply and that little resistance to high prices of food, clothing and other soft goods has been apparent.



The Index (see chart above): Latest Week (preliminary) 167 Previous Week 164 Month Ago 166 Year Ago 155

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)†	95.5	96.0	94.0	90.0
Electric Power Distributed (million kilowatt hours)	4,964	4,946	4,956	4,602
Bituminous Coal Production (daily av.—1000 tons)	2,100	2,125	2,040	2,131
Petroleum Production (daily av.—1000 bbl.)	5,295	5,268	5,196	4,730
Construction Volume (ENR—Unit $1,000,000)	$141.7	$91.3	$135.2	$55.2
Automobile and Truck Output (Ward's—number units)	105,587	89,180	106,894	87,680

* Dates on request. † 1947 weekly capacity is 1,749,928 net tons. 1946 weekly capacity was 1,762,381 net tons.

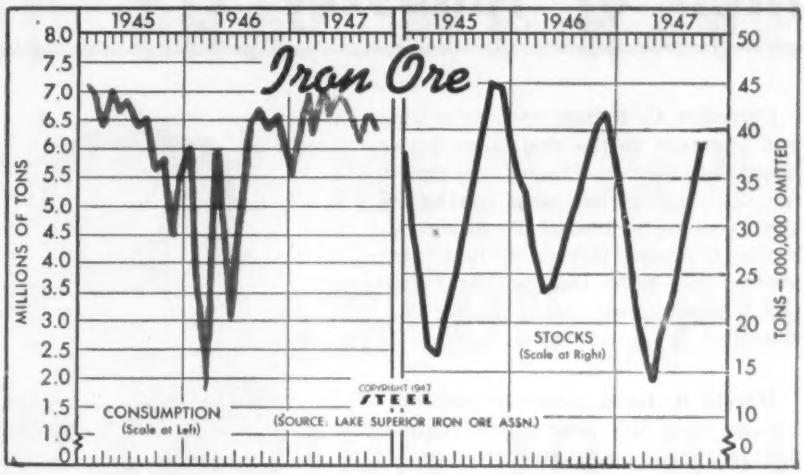
TRADE				
Freight Carloadings (unit—1000 cars)	952†	954	938	942
Business Failures (Dun & Bradstreet, number)	81	75	77	33
Money in Circulation (in millions of dollars)‡	$28,569	$28,656	$28,556	$28,585
Department Store Sales (change from like wk. a yr. ago)‡	+2%	+8%	+7%	+24%

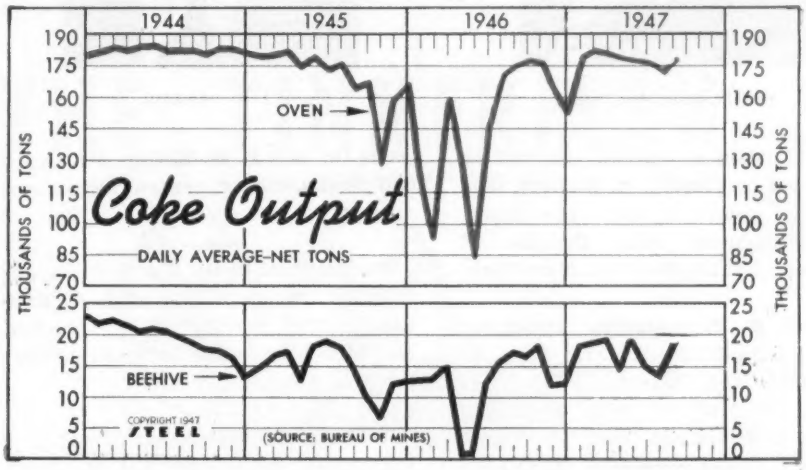
† Preliminary. ‡ Federal Reserve Board.

Iron Ore

(Lake Superior Iron Ore Assn.)
Gross tons—000 omitted

	Consumption		Stocks at Lake Erie Docks and Furnaces	
	1947	1946	1947	1946
Jan.	7,024	3,719	30,514	35,342
Feb.	6,264	1,748	24,317	33,647
Mar.	6,979	6,021	17,411	27,601
Apr.	6,579	4,769	13,555	23,079
May	6,885	2,990	17,618	23,905
June	6,500	4,995	21,746	26,265
July	6,156	6,460	28,440	30,439
Aug.	6,638	6,738	33,896	34,067
Sept.	6,492	6,380	38,370	37,573
Oct.	....	6,625	.....	40,435
Nov.	....	6,131	.....	41,919
Dec.	....	5,516	.....	37,465
Total	....	62,093	.....	.....





Coke Output

Bureau of Mines
(Daily Average—Net Tons)

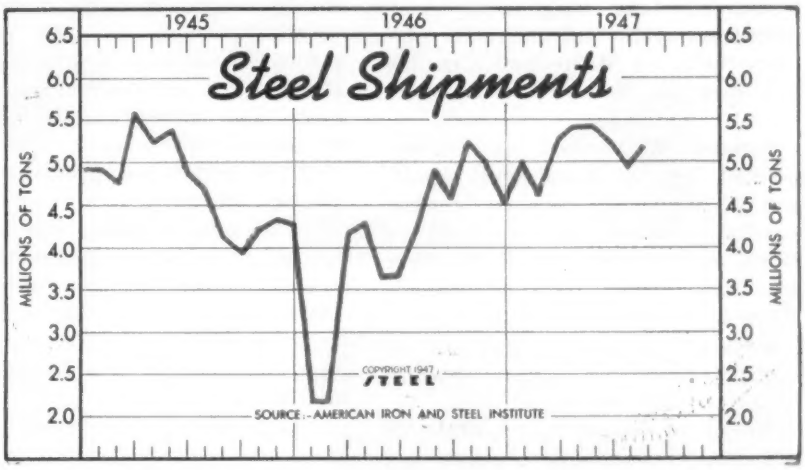
	Oven		Beehive	
	1947	1946	1947	1946
Jan.	181,245	122,570	18,124	13,093
Feb.	183,189	93,985	18,372	13,140
Mar.	182,529	161,290	18,725	14,962
Apr.	179,428	128,394	14,315	713
May	178,398	83,019	18,922	869
June	177,416	148,100	15,054	42,600
July	173,312	172,700	13,582	15,600
Aug.	181,737	177,300	18,369	17,400
Sept.	.....	178,156	.....	16,167
Oct.	.....	177,817	.....	17,954
Nov.	.....	164,165	.....	12,028
Dec.	.....	153,826	.....	12,302
Ave.	.....	146,877	.....	11,991

Steel Shipments

(Net Tons)

	1947	1946	1945
Jan.	5,061,333	2,189,369*	4,940,160
Feb.	4,626,424	2,189,368*	4,776,377
Mar.	5,304,415	4,213,913	5,632,155
Apr.	5,445,993	4,335,694	5,254,064
May	5,442,343	3,666,677	5,417,051
June	5,263,711	3,687,509	4,891,228
July	4,974,566	4,259,494	4,696,895
Aug.	5,278,223	4,965,456	4,123,578
Sept.	.....	4,589,902	3,955,198
Oct.	.....	5,260,832	4,267,177
Nov.	.....	5,019,984	4,366,567
Dec.	.....	4,533,420	4,297,502

* Figures for January and February, 1946, are merely averages derived from a report that combined shipments for those two strike-affected months into a total of 4,378,737.



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$15,015	$11,215	$13,026	$12,862
Federal Gross Debt (billions)	$259.1	$259.2	$259.0	$263.7
Bond Volume, NYSE (millions)	$26.2	$22.2	$16.4	$19.8
Stocks Sales, NYSE (thousands)	7,677	6,884	3,532	4,715
Loans and Investments (billions)†	$64.6	$64.7	$64.7	$58.3
United States Gov't. Obligations Held (millions)†	$38,103	$38,373	$39,022	$39,230

† Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$75.41	$75.41	$75.41	$64.45
All Commodities†	157.9	158.0	158.1	135.1
Industrial Raw Materials†	176.0	175.0	173.6	146.3
Manufactured Products†	151.1	151.7	152.7	133.7

† Bureau of Labor Statistics Index, 1926=100.

Men of Industry

Cornelius C. Felton, vice president and assistant to the chairman of the board of Revere Copper & Brass Inc., New York, has been elected to the company's board of directors. Prior to joining Revere in 1934, Mr. Felton was sales manager of Calumet & Hecla Consolidated Copper Co., Detroit.

—o—

Harold H. Reed, formerly assistant manager of the New York metropolitan district of Air Reduction Sales Co., New York, has been appointed manager of this district, to succeed **W. S. Schoenthaler,** who is retiring after 37 years of continuous service with the company. **Oren M. Donohue,** formerly assistant sales manager, has been appointed assistant manager, succeeding Mr. Reed. **William B. Brower** succeeds Mr. Donohue as assistant sales manager.

—o—

Crucible Steel Co. of America, New York, announces election of **J. F. Prince** as treasurer. He formerly had been comptroller of the ordnance operations of the company. **F. L. Cooper** has been appointed credit manager, and leaves the office of treasurer to take charge of all credit operations of the company. He succeeds the late **J. M. McComb,** Crucible vice president.

—o—

Sigmund W. Stewart has been appointed general purchasing agent, and **J. M. Menk,** assistant general purchasing agent, of the Vanadium Corp. of America, New York. They will have headquarters at Niagara Falls, N. Y. Mr. Stewart was formerly assistant purchasing agent of Continental Electric Co. Inc., Newark, N. J., and Mr. Menk was works accountant of Vanadium. **George W. Johnson,** formerly sales engineer, has been appointed manager, Steel Foundry Division, Vanadium Corp. of America, with headquarters in Chicago.

—o—

James O. Billingsley, former resident manager for H. Bettis Co., Zanesville, O., has resigned his position to accept the post of production manager for Strong Mfg. Co., Sebring, O.

—o—

A. F. Preuster, sales and service representative of the eastern states territory for International Graphite & Electrode Corp., Niagara Falls, N. Y., and St. Marys, Pa., has retired after 17 years of service. He will be succeeded by **Charles A. Gierach,** who has been connected with the American Manganese Steel Division of American Brake Shoe Co., New York.

FRANK R. KOHNSTAMM

J. F. RANKIN

—o—

Frank R. Kohnstamm, associated with Westinghouse Electric Corp. in Cleveland and Mansfield, O., has joined the staff of Jack & Heintz Precision Industries Inc., Cleveland, as general sales manager. Mr. Kohnstamm entered upon his career with Westinghouse in 1917. He was appointed manager of the appliance section in 1922, and later became assistant sales manager, Merchandising Division, with headquarters in Mansfield. In 1931 he was promoted to the position of director of merchandise for the same division, and in 1934 was placed in charge of the Westinghouse Lighting Division in Cleveland, but returned to Mansfield in 1939 as sales manager, Merchandising Division. He resigned from Westinghouse in 1942, and has since held executive positions with Vander Horst Corp. of America, operating plants in Lakewood, O., and Olean, N. Y., and with Baldwin Locomotive Works, at both San Francisco and Philadelphia.

—o—

The Refractories Division, Babcock & Wilcox Co., New York, announces appointment of **Albert R. Becker** as refractories sales engineer, specializing in the marine field. He will represent the company in the New York metropolitan area.

—o—

The Steel Co. of Canada Ltd., Montreal, Canada, announces appointment of **Lee T. Craig** as general sales manager of the company, with headquarters in Hamilton. He succeeds the late **D. B. McCoy.** Mr. Craig had been assistant general sales manager.

—o—

Parker Rust Proof Co., Detroit, announces the promotion of **J. F. Rankin** to the position of comptroller. He has been assistant comptroller for the past five years.

—o—

William H. Winfield, recently a marketing consultant for McKinsey & Co., New York, has joined Monsanto Chemical Co., St. Louis, as manager of a newly established department of economic research. **Dr. James H. Lum,** executive director of the company's Clinton Laboratories, Oak Ridge, Tenn., has been appointed managing director of Monsanto (Australia) Pty. Ltd., Melbourne, Australia.

—o—

W. H. Hoover, vice president and general counsel, Anaconda Copper Mining Co., New York, has been elected a director of the company. **T. A. Campbell,** vice president of the subsidiary companies, Andes Copper Mining Co., Chile Exploration Co. and Chile Copper Co., has been elected a member of the board of these companies.

—o—

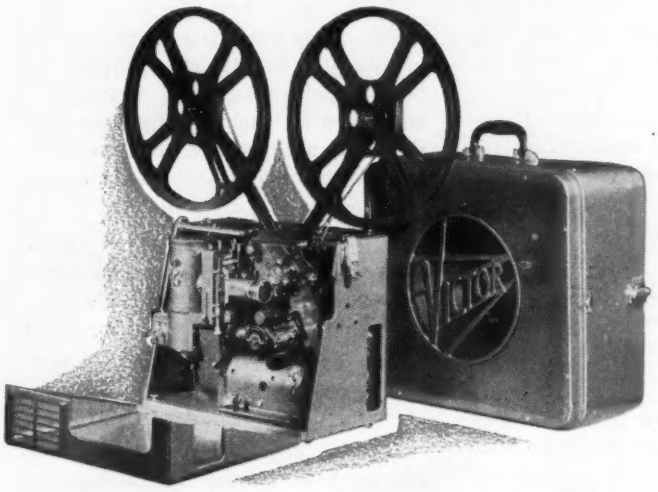
Lee O. Witzenburg has been appointed sales manager of the Drives & Die Casting Divisions of Congress Tool & Die Co., Detroit.

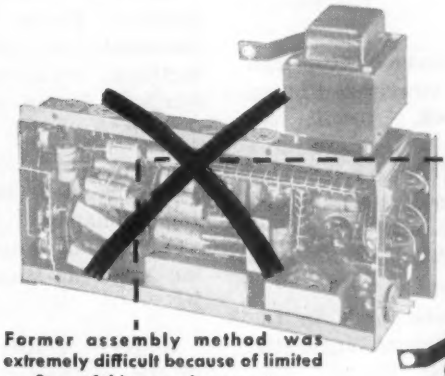
—o—

Cook Research Laboratories, Chicago, announces the appointment of **Dr. John C. Bellamy** as associate director. He will assist **Dr. Robert J. Downing,** director of the laboratories, in the development of new aircraft instrumentation and the engineering

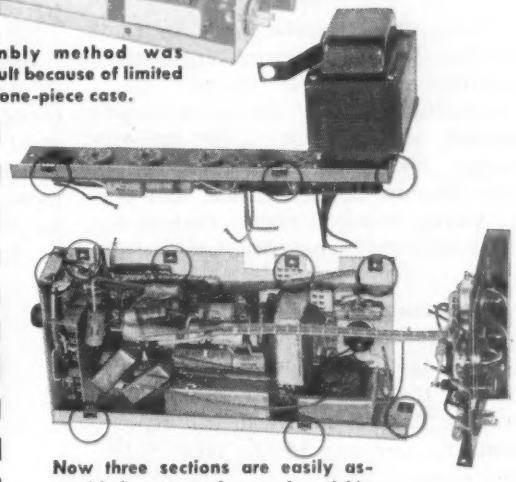
"WE DO FIND THAT WE HAVE REDUCED OUR ASSEMBLY COST APPROXIMATELY 36% ON THIS UNIT SINCE BEGINNING TO USE THE TINNERMAN SPEED NUT"

This is a direct quotation from a letter from A. S. Webeck, Works Manager of the Victor Animatograph Corporation, Davenport, Iowa, makers of 16 MM sound motion picture equipment.





Former assembly method was extremely difficult because of limited confines of this one-piece case.



Now three sections are easily assembled separately, and quickly fastened together with SPEED NUTS into completed unit.

SPEED NUTS always effect substantial savings in assembly cost, but here is a case of unusually high savings.

Victor Animatograph Corporation accepted our suggestions on the assembly of their amplifier unit. They discarded their time-consuming practice of assembling a myriad of small parts in a crowded case. Now the amplifier is assembled in three easy-to-get-at sections that are quickly fastened together with SPEED NUTS to complete the unit.

Assembler training time is cut from two months to a few hours. Assembly time is slashed, employee morale improved, and with three assembly lines instead of one, the risk of complete production stoppage due to shortage of one or two parts is avoided.

Let us demonstrate what SPEED NUTS can accomplish in improving the assembly of your product.

TINNERMAN PRODUCTS, INC.
2039 FULTON ROAD • CLEVELAND 13, OHIO

In Canada: Wallace Barnes Co., Ltd., Hamilton, Ontario
In England: Simmonds Aerocessories, Ltd., London
In France: Aerocessoires Simmonds, S. A., Paris
In Australia: Simmonds Aerocessories, Pty. Ltd., Melbourne

Speed Nuts*
PATENTED
MORE THAN 4000 SHAPES AND SIZES
* Trade Mark Reg. U. S. Pat. Off.

FASTEST THING IN FASTENINGS

of motion-measuring devices. Dr. Bellamy has been assistant professor at the University of Chicago, and was special consultant to the Army Air Forces from 1943 to 1945.

—o—

Pennsylvania Salt Mfg. Co., Philadelphia, announces that **Charles R. Sorber Jr.** and **John L. Dawson** have joined the sales staff of the Special Chemicals Division.

—o—

C. Bruce Hill, president, Engineering, Tool & Forgings Ltd., St. Catharines, Ont., has been elected president of the Canadian Chamber of of Commerce.

—o—

The United States Atomic Energy Commission announces the establishment of a Division of Raw Materials, and has named **Dr. John K. Gustafson** of Salt Lake City as director.

—o—

American Society of Safety Engineers has elected **R. H. Ferguson,** manager of safety for Republic Steel Corp., Cleveland, as first vice president of the society.

—o—

William L. Cressman, Pittsburgh district manager, American Rolling Mill Co., Middletown, O., will succeed **F. A. Tobitt** as eastern area manager upon Mr. Tobitt's retirement Jan. 1. **William Crout,** assistant district manager, Cleveland, will succeed Mr. Cressman at Pittsburgh.

—o—

Three appointments made in the Turbine & Gear Divisions, apparatus department, General Electric Co., Schenectady, N. Y., are: **C. S. Coggeshall,** manager of sales; **W. E. Saupe,** manager, Schenectady Turbine Manufacturing Division; and **W. L. Young,** manager, Lynn Turbine & Gear Manufacturing Division.

—o—

Esterline-Angus Co. Inc., Indianapolis, announces appointment of **W. H. Bollinger** as exclusive representative for the Pittsburgh territory, succeeding **T. A. Kenny,** who will represent the company in the New York metropolitan area.

—o—

James E. Nichols has been appointed chief stationary engineer, Youngstown Sheet & Tube Co., Youngstown, succeeding **F. B. Rathburn,** who retired recently.

—o—

Appointment of **W. Ray Culp** as manager of industrial sales, Pacific Coast, for the Paint Division of Pittsburgh Plate Glass Co., Pittsburgh, has been announced by the company. He succeeds **R. Stanton Richter,** who will serve the West Coast area as a sales representative specializing in automobile production finishes.

—o—

M. H. LaChance, metallurgical engineer, has been named to the staff of Battelle Memorial Institute, Columbus, O., where he will engage in research in physical metallurgy.

—o—

J. Schuyler Casey, president of M. H. Treadwell Co. Inc., New York, has been elected president of the United Engineering Trustees Inc., at its meeting, Oct. 23, in New York. He succeeds **J. P. H. Perry,** vice president, Turner Construction Co., who served as president of the group from 1945 to 1947.

—o—

Kennametal Inc., Latrobe, Pa., manufacturer of cemented carbide tools, announces appointment of **K. W. Jonvik,** Oslo, Norway, as representative.

—o—

Marvin T. Arnsdorff Jr., formerly manager of advertising production, Southern States Iron Roofing Co., Savannah, Ga., will supervise all advertising, except catalogues, for Southern States, fabricator of metal roofing.

—o—

Ray Sanders has been appointed general manager of the Pacific Chemical Co., Los Angeles, a division of the American-Marietta Co.

—o—

Ralph C. Moffitt has been promoted to the position of assistant to vice president-purchases, United States Steel Corp., New York. He has been serving in Pittsburgh as purchasing representative, handling purchasing for Columbia Steel Co.'s expansion and reconversion programs in the far west. He had previously been in the purchasing department of Columbia Steel, U. S. Steel subsidiary, in San Francisco.

—o—

Thomas F. McCarthy has been named Eastern Division manager for Edwards & Co., Norwalk, Conn., manufacturer of electric signaling, communication and protection equipment. He will have headquarters in New York.

—o—

Norbert J. Connors has resigned as sales promotion and advertising manager of Eastern Stainless Steel Corp., Baltimore. Mr. Connors, who joined Eastern Stainless in 1945, previously held sales positions with Sharon Steel Corp. at Philadelphia and New York, from 1936 to 1945, and with Republic Steel Corp. in Philadelphia from 1933 to 1936.

—o—

Colorado Fuel & Iron Corp., Denver, announces that **H. C. Allington** has been appointed general manager of sales of the Wickwire Spencer Steel Division, with offices in New York. He has been assistant general sales manager of the division.

—o—

George V. Ward has become superintendent of the Stowe-Fuller Refractory plant at Strasburg, O., which is an affiliate of the Robinson Clay Products Co., Akron.

—o—

General Electric Co., Meter & Instrument Divisions, Schenectady, N. Y., announces appointment of **I. F. Kinnard** as manager of engineering, **H. L. Ross,** manager of manufacturing, and **E. H. Howell,** manager of

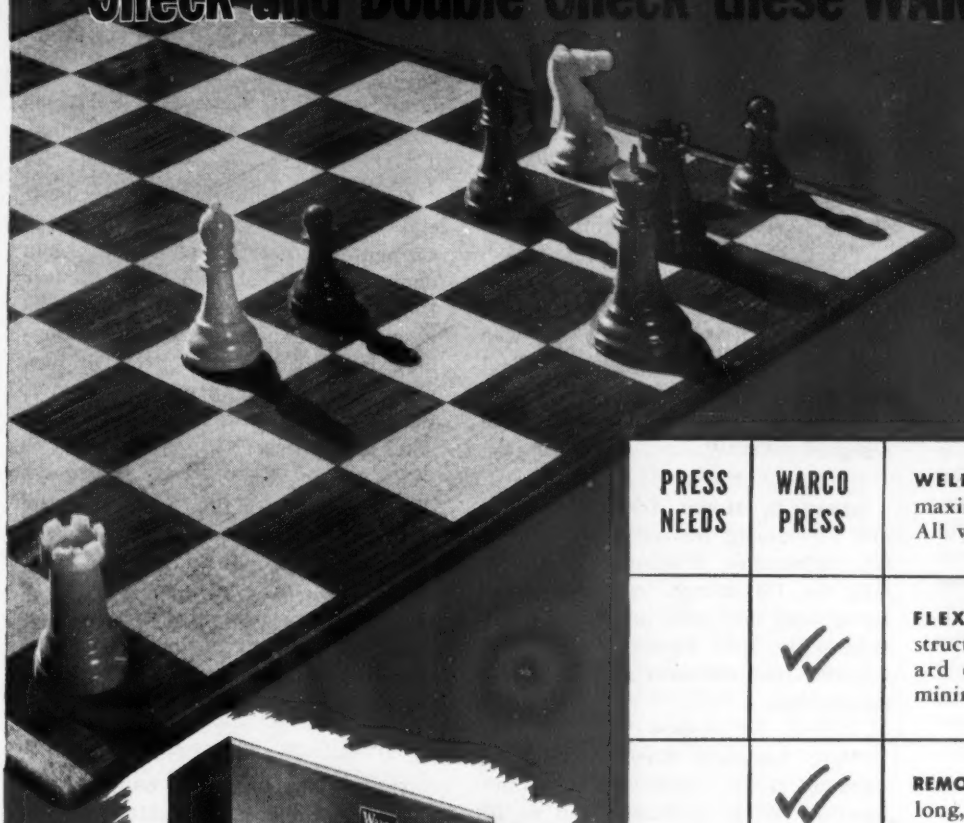
LOUIS LYON JR.

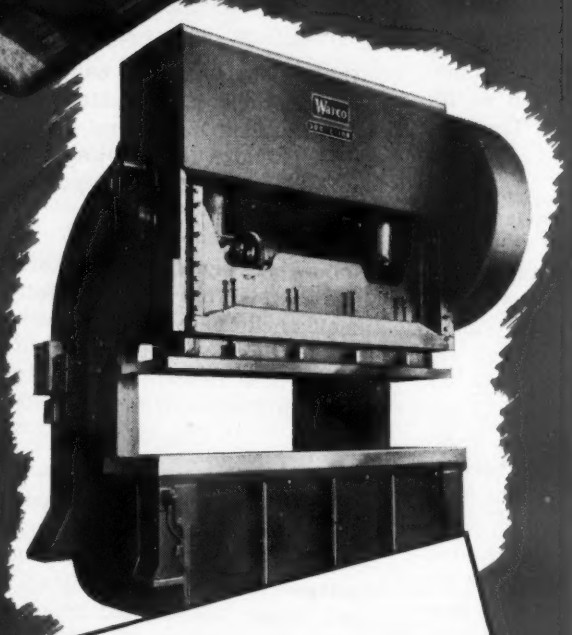
Has formed his own organization, Lyon & Co., Pittsburgh. He will represent several manufacturers of refractory products. Noted in STEEL, Oct. 27 issue, p. 70

R. G. SAULT

Vice president, Porter Forge & Furnace Inc., Somerville, Mass., elected president of the Metal Treating Institute at a recent meeting in Chicago. STEEL, Oct. 27 issue, p. 73

Check and Double Check these WARCO Features





PRESS NEEDS	WARCO PRESS	
		WELDED STEEL CONSTRUCTION for maximum strength, rigidity and die life. All welded parts fully stress-relieved.
	✓✓	**FLEXIBILITY** of all-steel welded construction permits alteration of standard designs for special purposes at minimum cost.
	✓✓	**REMOVABLE BRONZE-LINED GIBS** for long, trouble-free life.
	✓✓	**AIR-OPERATED FRICTION CLUTCH** and spring-loaded brake with electric control minimizes clutch maintenance, provides precision control for operator safety.
	✓✓	**STANDARD OR SPECIAL CONTROLS** to suit specific needs.
	✓✓	**CENTRALIZED LUBRICATION** system standard on all models. Automatic or one-shot lubrication optional.
	✓✓	**WIDE RANGE OF SIZES AND TYPES.** The most complete line made. From 50 to 2000 tons or more in OBI, Horn, Gap, Straight Side Single and Double Crank, Eccentric Gear and Four Point Presses, Double and Triple Action Presses, Press Brakes and Hydraulic Presses.

Warco PRESS

WARREN CITY MANUFACTURING COMPANY

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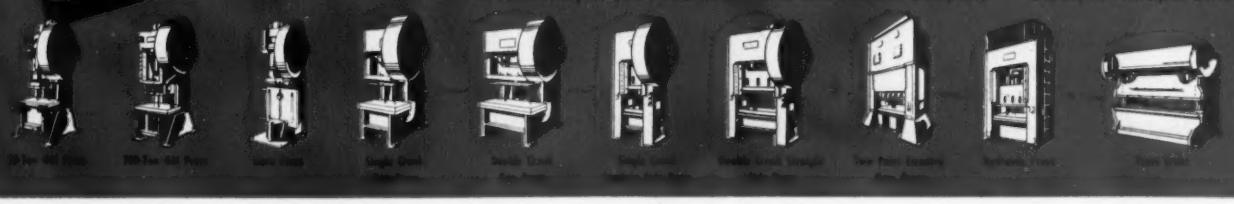


sales. All three men have been affiliated with General Electric's meter and instrument business in similar capacities. Mr. Kinnard was works manager of the West Lynn, Mass., works, headquarters of the Meter & Instrument Divisions. Mr. Ross was general superintendent of the works. Mr. Howell was manager of the sales units comprising the former Meter & Instrument Division, which embraced commercial operations exclusively.

—o—

Hiland G. Batcheller, president, Allegheny Ludlum Steel Corp., Pittsburgh, has been elected a trustee of the Committee for Economic Development.

—o—

Frederic W. Mellor has joined the Foundation Co., New York, as assistant to the president. He recently resigned as general sales manager of the H. K. Ferguson Co., industrial engineer and builder, of Cleveland. Mr. Mellor will now concentrate his efforts on sales in the industrial field and in the field of public utilities, where the Foundation Co. has specialized in the design and construction of power plants.

—o—

Robert R. Robinson, Syracuse, N. Y., branch manager of Owens-Illinois Glass Co., has been named manager of the Cleveland branch. He succeeds **Lawrence N. Crossley,** who has been appointed manager of the Brewery Sales Division of the company.

—o—

James D. Lightbody Jr. has been appointed assistant to the president of Bryant Heater Co., Cleveland.

—o—

W. H. Propst, sales manager of AllianceWare Inc., Alliance, O., for the past 13 years, has been appointed manager of the recently created Appliance Division, Gordon Armstrong Co. Inc., Cleveland.

—o—

Eugene G. Gwyer has been appointed to the engineering sales department of Hanson-Van Winkle-Munning Co., Matawan, N. J.

—o—

L. H. Matthes, district manager for apparatus products in the Texas area, has been named manager of marketing in the air conditioning department of General Electric Co., Schenectady, N. Y. He will make his headquarters in Bloomfield, N. J.

—o—

Alabama Chapter, American Society of Safety Engineers has elected the following members to its executive committee: **J. L. Shores,** Alabama Power Co.; **P. M. Cassidy,** Sloss-Sheffield Steel & Iron Co.; and **A. H. Witt,** Mine Safety Appliance Co.

—o—

Harold O. Hill, assistant chief engineer of fabricated steel construction for Bethlehem Steel Corp., Bethlehem, Pa., has been elected president of the American Welding Society. He took office Oct. 24 at the society's annual convention.

—o—

Harry J. Welch has been appointed advertising manager, Falk Corp., Milwaukee. Until recently he was with the Milwaukee Electrical Tool Co. as advertising manager. Mr. Welch succeeds **Charles A. Petri,** who resigned recently.

—o—

Angus B. Morse, formerly assistant advertising manager, Delta Mfg. Co., Milwaukee, division of Rockwell Mfg. Co., Pittsburgh, has been named advertising and sales promotion manager of the J. W. Speaker Corp., Milwaukee, manufacturer of automotive accessories.

—o—

Ward Leonard Electric Co., Mt. Vernon, N. Y., announces appointment of **W. R. L'Hommedieu** as its sales representative in the Los Angeles area.

—o—

Kenneth Seaver has been elected chairman of the board and re-elected treasurer of Pittsburgh Metallurgical Co. Inc. He recently retired as senior vice president of Harbison-Walker Refractories Co., Pittsburgh, but remains a director of that company. He is one of the original founders of the Pittsburgh Metallurgical Co., chartered in 1913. **Charles F. Colbert Jr.** was re-elected president of the company. **Ben F. Webster Jr.** was elected secretary and assistant treasurer. **John T. Mechem** was re-elected assistant secretary, and **Kenneth Seaver, Charles F. Colbert Jr.** and **William McElderry** were elected members of the executive committee.

—o—

A new consulting group appointed by the Army Ordnance Department, dealing with problems relating to tests, specifications and research in materials, has been organized by the American Society for Testing Materials. It is known as the ASTM Ordnance Advisory Committee. Chairman of the committee is **C. L. Warwick** of the ASTM. Members of the committee are: **A. W. Carpenter,** B. F. Goodrich Co., Akron; **P. V. Faragher,** Aluminum Co. of America, Pittsburgh; **W. H. Finkeldy,** Sign-master & Breyer; **Neil A. Fowler,** General Box Co., Chicago; **J. C. Geniesse,** Atlantic Refining Co., Philadelphia; **J. J. Kanter,** Crane Co., Chicago; **N. L. Mochel,** Westinghouse Electric Corp., Pittsburgh; **H. K. Nason,** Monsanto Chemical Co., St. Louis; and **J. R. Townsend,** Bell Telephone Laboratories, New York.

—o—

Gordon H. Baker, formerly associated with the sales department of Carpenter Steel Co. at Detroit, has opened offices at 446 New Center Bldg., Detroit, as manufacturer's representative handling precision stampings, lamination and progressive dies, and rolls for roll forming machines, with particular emphasis on stainless steel specialties.

—o—

Edward C. Engle, active in the tooling and engineering field for 35 years, has joined Engineering Inc., Milwaukee, as vice president in charge of tool designing and procurement. He formerly had been with the Diesel Division, Harnischfeger Corp., Milwaukee, as chief tool engineer.

—o—

C. S. Dent has been named manager of a new auto battery manufacturing plant at Mineral Ridge, O., for Globe Union Inc., Milwaukee. The plant expects to start production about Dec. 1.

—o—

James S. Vanick of the Development & Research Division, International Nickel Co., New York, has been named chairman of the Gray Iron Division Research Committee of American Foundrymen's Association.

—o—

Frank T. Lewis has been appointed assistant manager of the Schenectady Works, General Electric Co., Schenectady, N. Y. He had been production manager of the company's West Lynn, Mass., Works, and transferred to the Schenectady Works in 1943, when he was named assistant to the works manager, giving particular attention to the Transmitter Manufacturing Divisions at Schenectady and Syracuse, N. Y.

—o—

Shelby York has been appointed assistant sales manager, United States Television Mfg. Corp., New York.

—o—

Ernest Richardson has retired from the presidency of Ingram-Richardson Mfg. Co., Beaver Falls, Pa., after 46 years' service with the company. He is a co-founder of Ingram-Richardson, and since 1901 has been a directing head. He served continuously as

RALPH H. LUNDBERG
Elected a vice president of Peninsular Grinding Wheel Co., Detroit. Noted in STEEL, Oct. 27 issue, p. 73

CLARENCE SNYDER
Elected chairman of the board, Snyder Tool & Engineering Co., Detroit. Noted in STEEL, Oct. 27 issue, p. 70

HOWARD N. MAYNARD
Elected president and treasurer, Snyder Tool & Engineering Co., Detroit. Noted in STEEL, Oct. 27 issue, p. 70

director and treasurer from the company's beginning, and as president from 1942 until his retirement. **J. Fred Ingram,** new president, is the younger son of the late Louis Ingram, also a co-founder of the company.

—o—

Arthur Nikand has been appointed factory manager of the Portland plant of the Hyster Co., Portland, Oreg.

—o—

In the Oct. 20 issue of STEEL, **David J. Foran** was erroneously reported as sales manager of the Titusville, Pa., Boiler Division, Struthers Wells Corp., Warren, Pa. Mr. Foran has been appointed to a position in charge of sales for the Buffalo district office, which covers New York State with the exception of the metropolitan New York area. The appointment is to the Titusville Iron Works Division of the corporation, rather than the whole corporation. **A. E. Jennings** is the national sales manager of the Titusville Iron Works Div., the headquarters of which are in Titusville.

—o—

Frank R. O'Donnell has been named manager of the Champion Forge Co., which recently acquired the assets of the Champion Machine & Forging Co., Cleveland. **Lester L. Reuse** has been appointed in charge of sales, and the following have been appointed sales representatives for the company: **C. A. Carr,** Detroit; **Homeier & Co.,** Akron; **Oliver Metals Inc.,** Cleveland and Western Pennsylvania; **Stanley-Dierdorf Inc.,** New York and Eastern United States.

—o—

C. H. Wills has been named general sales manager, Michigan Abrasive Co., Detroit, with responsibility for the world-wide sales of Michigan Abrasive materials, which include sheets, rolls, discs and belts of all types and sizes.

—o—

S. W. Beal Jr. has been named western area credit manager, Carnegie-Illinois Steel Corp., U. S. Steel Corp. subsidiary. This is a new position and brings to the Chicago office many of the credit functions formerly handled elsewhere.

—o—

Owen M. Griffith has been appointed Buffalo district sales manager of Harbison-Walker Refractories Co., Pittsburgh. He became associated with the company in 1930 as a salesman in the Pittsburgh district sales office, later being transferred to Buffalo.

—o—

Jerome G. Brady has been appointed tool engineer and representative working out of the Pittsburgh district office for Kennametal Inc., Latrobe, Pa. **Lester Speickhoff** has been appointed tool engineer and representative in the Syracuse, N. Y., area.

—o—

Raymond H. Jebens has joined the Patterson Foundry & Machine Co., East Liverpool, O., as chief chemical engineer.

OBITUARIES . . .

Martin Pedersen, 66, vice president of the Specialty Brass Co., Kenosha, Wis., died at his home in that city Oct. 23 following a prolonged illness. He was one of the founders of Specialty Brass Co., and was also a director of that company.

—o—

Carl A. Channon, president of the Great Lakes Supply Corp., Chicago, died suddenly Oct. 9.

—o—

Malcolm G. Pierson, 51, president and treasurer of Foote-Pierson & Co., Newark, N. J., manufacturer of electrical precision instruments, died Oct. 16 following a heart attack.

—o—

William B. H. Hazard, 84, former New York iron and steel merchant, died in Mt. Vernon, N. Y., Oct. 20. He had been associated for more than 50 years with the former Vought & Williams Iron & Steel Merchants, and was manager of the firm's uptown branch in New York at the time of his retirement 10 years ago.

—o—

Philip H. Leckinger, 73, founder of High Speed Hammer Co. Inc., Rochester, N. Y., died recently in Los Angeles. He was inventor of the high speed hammer which the company produces.

—o—

Thomas J. Davey, 58, a member for 23 years of the Construction Division, Standard Oil Co. refinery in Linden, N. J., died Oct. 24.

—o—

Robert C. Bogart, 74, office manager for the Industrial Electrical Corp., Elizabeth, N. J., died Oct. 22 at his home in that city.

—o—

Henry J. Bellesheim, 58, sales representative for Bard Parker Co., Danbury, Conn., manufacturer of surgical instruments, died Oct. 22 while on a business trip in Cleveland.

Radiography
Internal Quality

RADIOGRAPHY as a means of interpreting internal quality of die castings reveals defects on 100 per cent of the castings by a nondestructive method. In addition to exposing amount and location of these defects, a permanent record can be maintained for future reference. Defects most prevalent in die castings consist of porosity, cold shuts, inclusions and shrinks. Most common defect is porosity, which is detrimental to castings from both structural and machining standpoints.

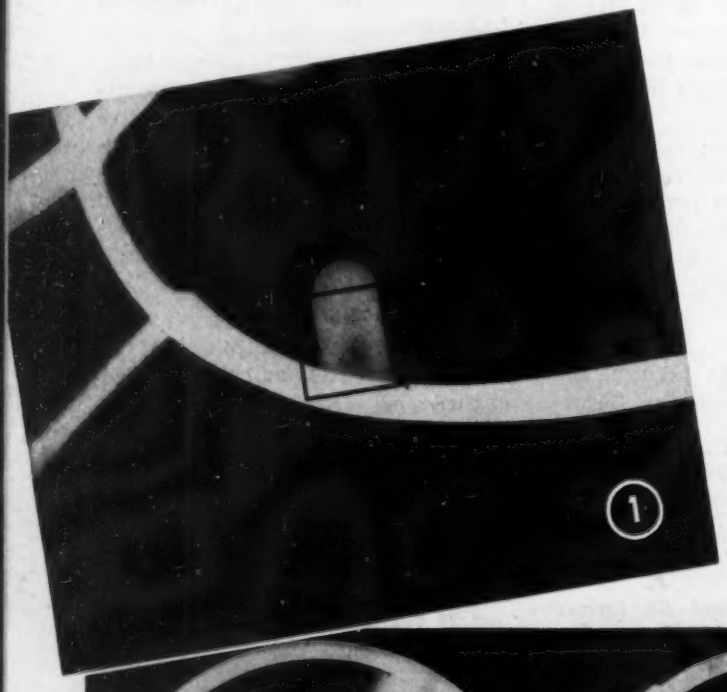
Equipment employed, a model OX-140 unit, manufactured by General Electric X-Ray Corp., Chicago, is a direct radiographic type with an enclosed steel cabinet, shielded by 1/8-inch lead sheeting for protection of the operator from stray radiation. This cabinet contains the tube which is positioned at the top and supported by an arm attached to a control so the tube can operate in an arc of approximately 60 degrees. Height of the tube can be varied from 20 to 40 inches. This is hand-operated and held in position by a steel pin placed in a hole in the shaft. Holes are spaced at 1-inch intervals to obtain various heights of the tube.

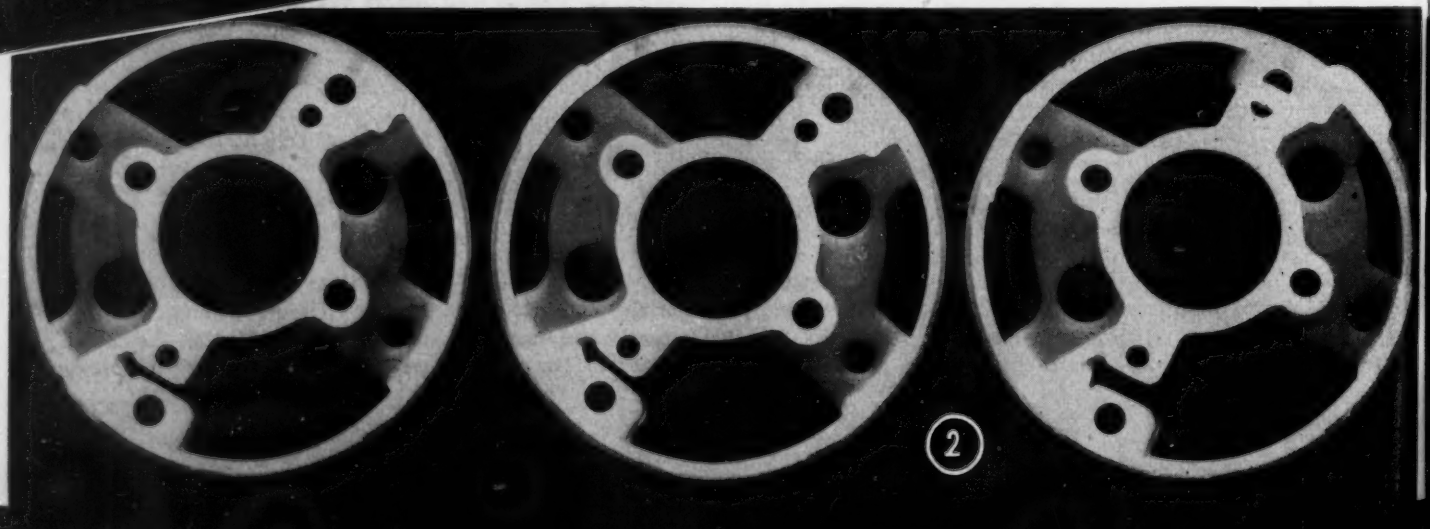
Unit is rated at 140 kilovolts with a maximum of 10 milliamperes at 70 kilovolts or 5 miliamperes at 140 kilovolts. It will penetrate a 5-inch section of aluminum or 3/8-inch section of zinc at maximum capacity, with a 2-minute exposure. Film employed for radiographic work should have good contrast as well as latitude. Types of film, such as Eastman A and Ansco Superay B, are very good for die casting work. However, Eastman M and Ansco Superay A are used when detail and contrast are prime factors.

A sensitivity of 1/2 per cent can be obtained for aluminum with the proper technique and fine grain film suitable for this work. Sensitivity is measured by the use of a penetrameter. Step block type, Fig. 3, is employed in the laboratory to check the concentration of the developing solutions, as well as the sensitivity. This is determined by comparing the density of the test radiograph with that of a standard radiograph, developed with known solution concentration. Refresher solution is added in order to keep the developing solution to the proper concentration so that the desired density can be maintained on the films.

In order to determine the amount of stray radiation emitted by the x-ray equipment, a minometer check is made once each month. This is made by a pencil-type ionization chamber, which is carried by the technician for an 8-hour period. At the end of this time the amount of stray radiation is determined by an electrometer. To this date no readings have been near the value of 0.1 roentgen established as the standard daily allowable dosage.

There are two types of die casting machines employed in the foundry for manufacturing of aluminum castings. They are the gooseneck and cold chamber. With the gooseneck process metal is injected into the die cavity by an accumulated pressure of air at approximately 500 per square inch. However, by the cold chamber process metal is injected by a ram actuated by some type of hydraulic system. Injection pressures of 6000 to 15,000 per square inch are usually employed; pressures of 50,000 to 60,000 per square inch have been used for certain applications by some die casters. (*Please turn to Page* 121)

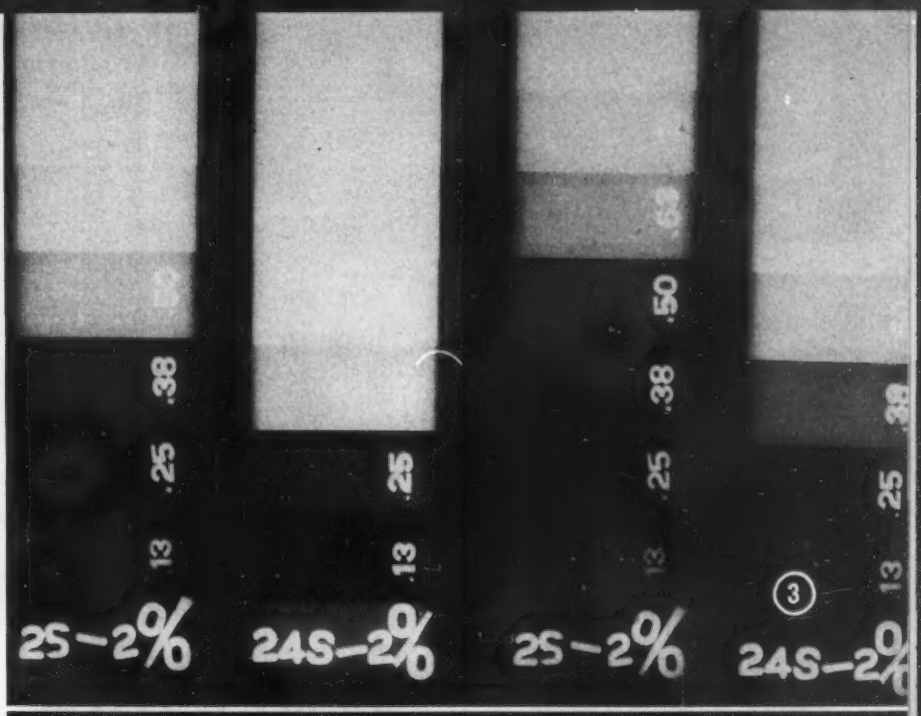




Reveals of Die Castings

Defects such as porosity, cold shuts, inclusions and shrinks exposed by nondestructive method which may be used on 100 per cent of castings

By R. W. DIVELY
Radiologist
Die Casting Division
The Hoover Co.
North Canton, O.



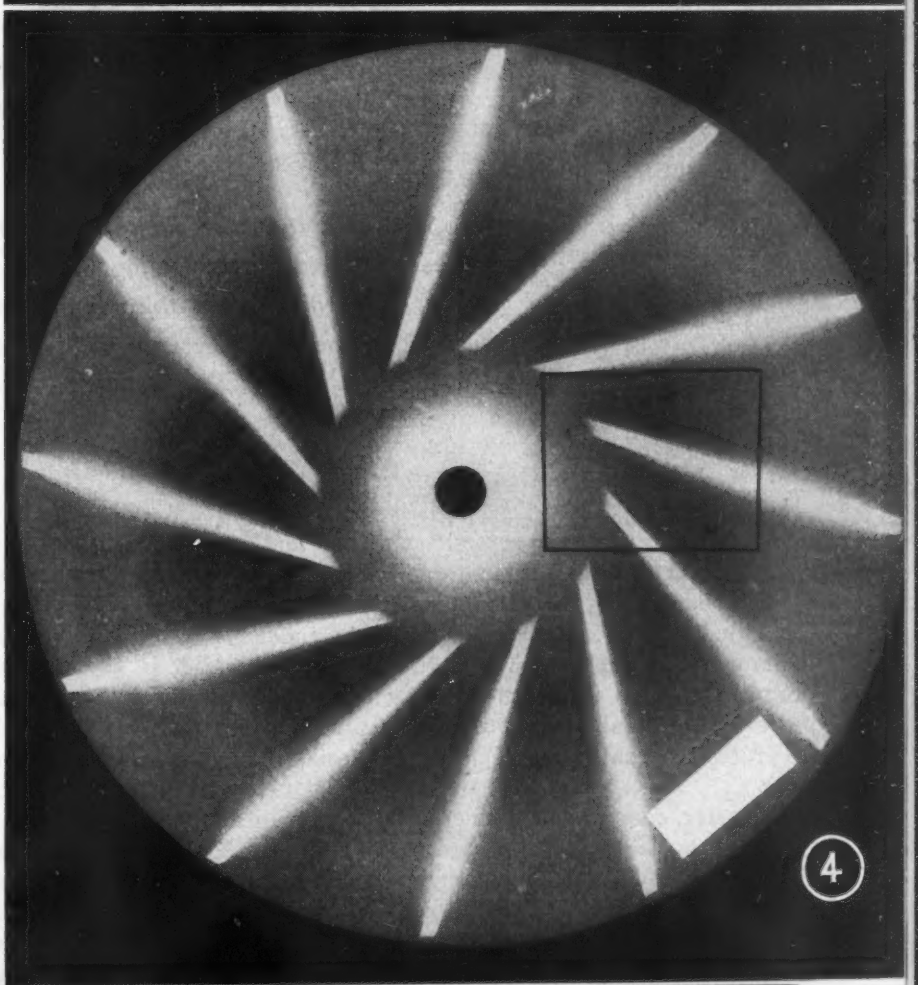


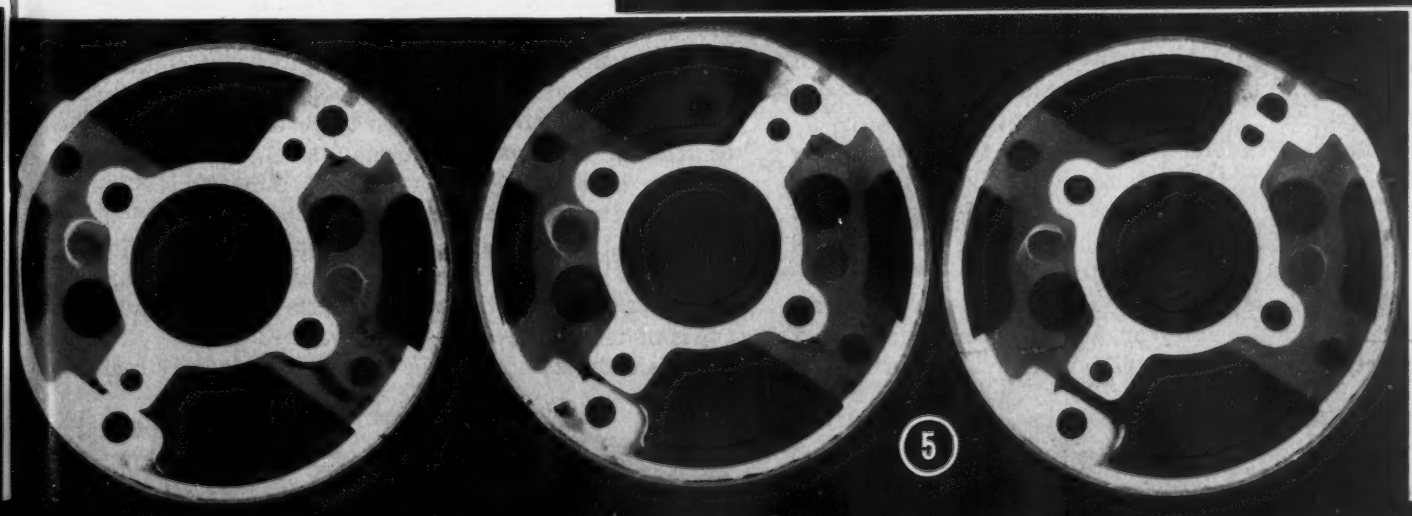
Fig. 1—Shrinks indicated in center usually can be seen from some outside surface characteristic

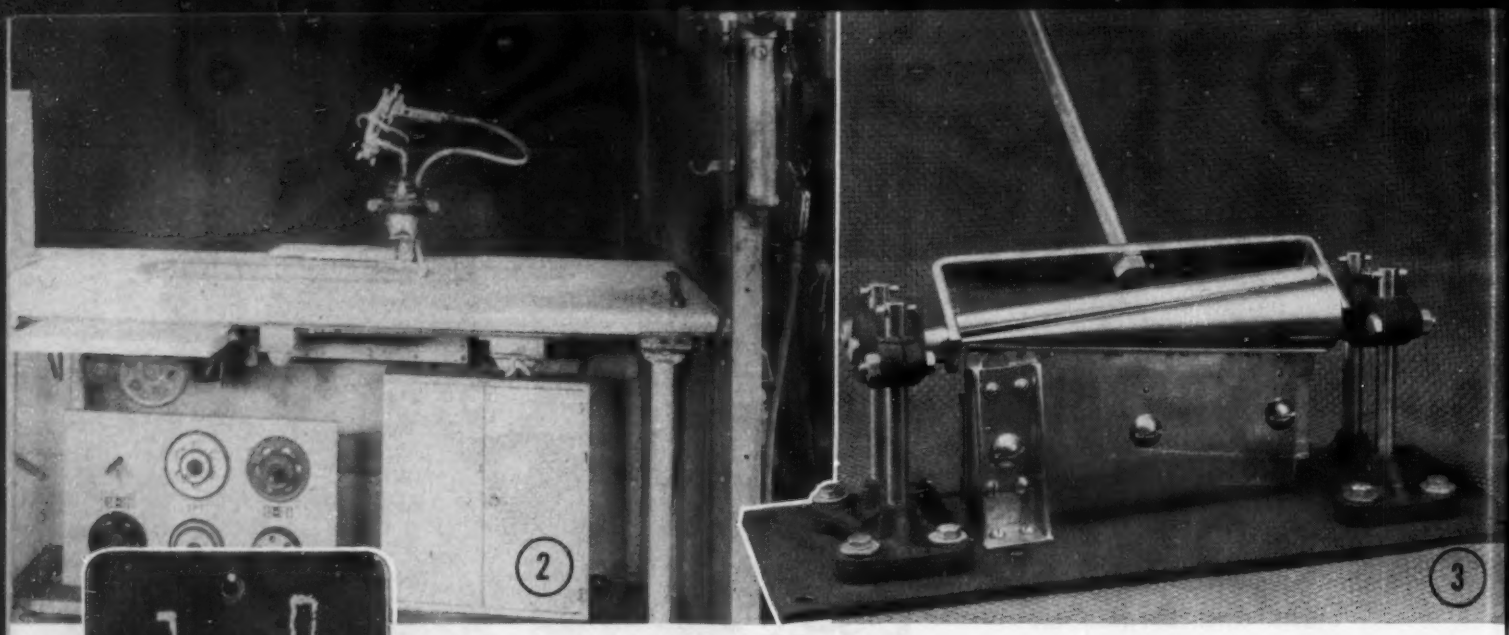
Fig. 2—Radiograph of proper machine setup

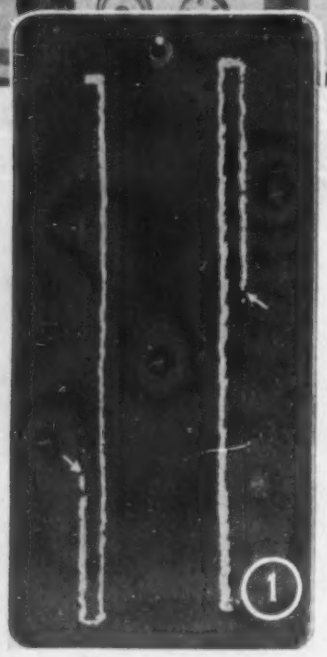
Fig. 3—Step block type penetrameter used to check concentration of developing solutions as well as sensitivity

Fig. 4—Cold shuts can be seen in square

Fig. 5—Radiograph of improper machine setup







SYMPOSIUM ON Modern Metal

Properties, advantages, limitations and general possibilities for various types of corrosion-protecting finishes and alloys are discussed by seven authorities at the third annual meeting sponsored by American Chemical Society, American Institute of Chemical Engineers, Electrochemical Society

MERITS of various protective finishes and corrosion resistant alloys are continually being pondered by engineers and production men in the metalworking industry in designing new products and seeking to improve durability and performance of established products. Many examples can be cited of improved performance obtained by proper selection and testing of protective coatings and corrosion resistant materials.

Basis for comparison of methods of metal protection, is provided by data presented by seven authorities before the third annual symposium on modern metal protection in Cleveland recently, sponsored by local sections of American Chemical Society, American Institute of Chemical Engineers and by the Electrochemical Society. Properties, advantages, limitations and general possibilities for various types of corrosion protecting finishes and alloys were discussed.

Selection of Protective Coatings for Metals: By K. G. Compton, Bell Telephone Laboratories, Murray Hill, N. J. Estimated cost of corrosion of upwards of $10 billion annually would be multiplied many fold if it were not for the use of protective coatings. In this country alone the cost of the raw materials used each year in the protective coatings industry exceeds a half billion dollars. Labor cost of application of protective coatings is several times the raw materials cost. Thus it becomes evident that the proper selection and evaluation of protective coatings assumes a role of considerable importance.

In general, the kind of coatings that will achieve the desired results are first determined, and then a final selection made on the basis of economic considerations such as cost, facilities available, and customers' preference.

In deciding on the suitability of a protective coating many tests are employed. Some of these consist of exposure to accelerated environment conditions, and others of physical tests on the coatings. Many of the tests must be made on a comparative basis since the testing conditions are not reproducible, or the results do not lend themselves to numerical evaluation.

Corrosion tests consist in the exposure of suitable specimens to various environments, and determining the point at which attack upon the base metal begins, or reaches a maximum allowable level. These tests usually take the form of outdoor atmospheric exposure, immersion in sea water, or chemical solution, or burial in the soil. Salt fog chambers, humidity room and cabinets, and the "so-called" weathering machines are well known examples of accelerated types of test.

Physical tests on metallic coatings are largely limi-

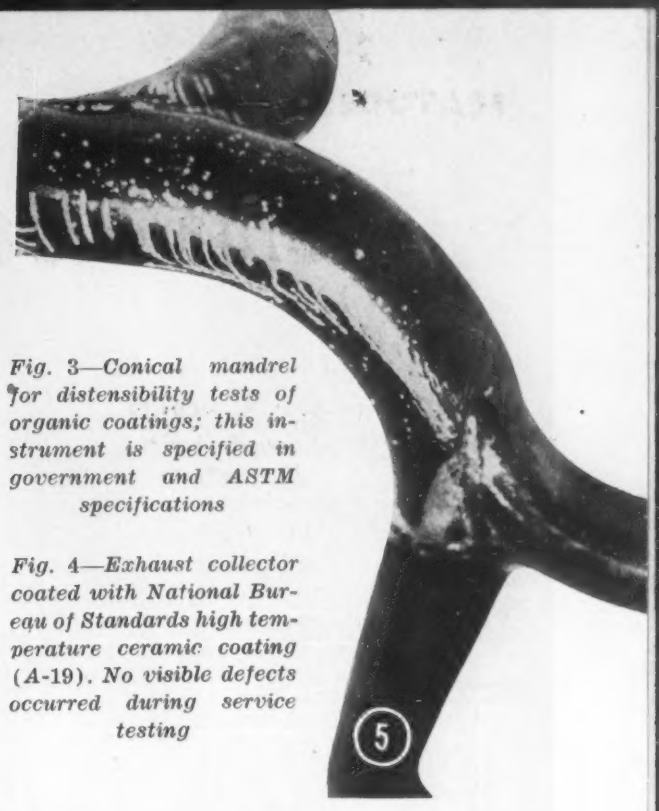


Fig. 3—Conical mandrel for distensibility tests of organic coatings; this instrument is specified in government and ASTM specifications

Fig. 4—Exhaust collector coated with National Bureau of Standards high temperature ceramic coating (A-19). No visible defects occurred during service testing

Fig. 5.—Exhaust collector and muffler for small aircraft engine, coated with conventional type porcelain enamel. This finish gave substantial protection but developed cracks and blisters which exposed some of the steel. Photos 4 and 5 courtesy National Bureau of Standards

Protection

Fig. 1—Specimen tested for impact resistance by Bell Telephone Laboratories' impactometer. Arrow indicates position of impact pattern where finish was first shattered. This also represents minimum energy, in revolutions per minute of the impact tool necessary to disrupt the film

Fig. 2—Automatic spray machine developed in Bell Telephone Laboratories for use in producing films of controlled and uniform thickness on test panels

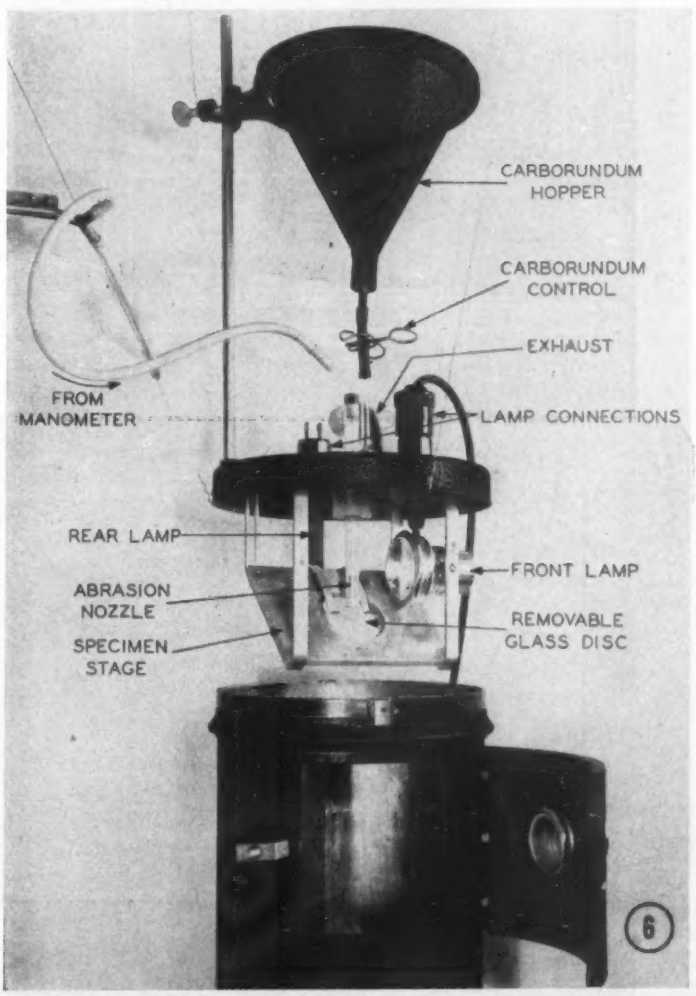
ted to bending or wear tests; in the case of inorganic coatings, both wear and some type of shock test may be employed. However, it is in the organic coating field that the types of test become extensive. Most of the physical tests on organic coatings seek to give an evaluation of properties related to the adherence of the coating to the base metal, its distensibility, abrasion resistance, hardness, and resistance to scratching or mar.

Physical properties of many organic coatings vary widely with the thickness of the coating so one of the first requisites of testing is to produce uniform films of the nominal thickness expected on the product. Shown in Fig. 2 is an automatic spray machine developed in the Bell Telephone Laboratories for use in producing films of controlled and uniform thickness on test panels.

This automatic machine employs a spray gun of standard type which is mounted so that it moves at a uniform rate past the panel to be finished. Speed of the travel of the gun can be changed by changing gears. There is a straight line relation between film thickness, and the speed of travel of the spray gun with given spray conditions and consistency of materials.

Various methods of determining hardness have been developed, notably those based on indentation, such as the Pfund and (*Please turn to Page* 122)

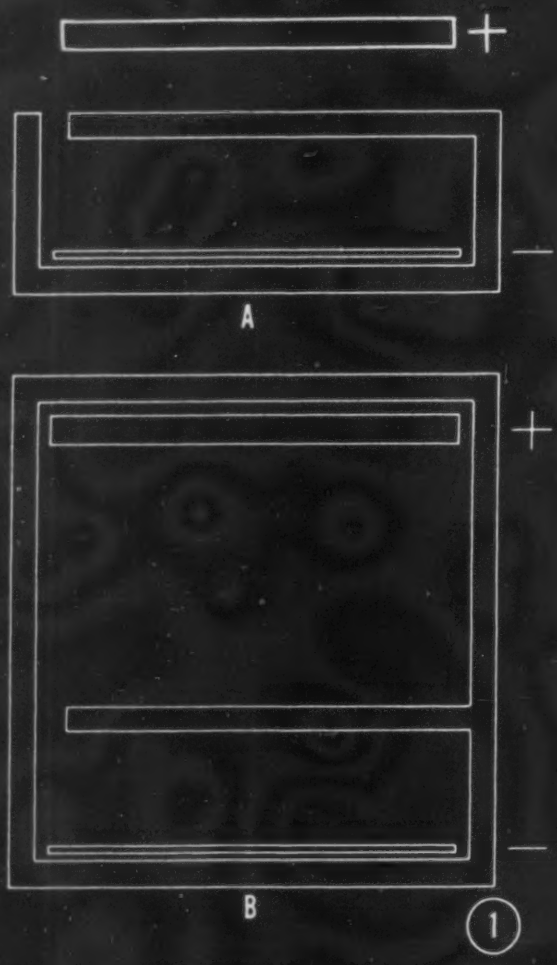
Fig. 6—Details of abrasion test apparatus, open. A coated specimen is subjected to cutting action of many small abrasive particles impelled at controlled velocity against coated surface



FEATURES OF THE

Slot Plating Range Cell

By J. B. MOHLER
Research Chemist
New Castle, Pa.



PLATING range of an electroplating bath consists of the entire range of current densities that produce a satisfactory deposit.

At very low current density plating does not take place. As the current density is increased a point is reached where plating starts. At slightly higher current densities some plating may take place so that the deposit is spotty and does not cover completely. Baths that have ability to plate at low current densities are baths that are high in covering power. Ability to cover is often increased by use of addition agents.

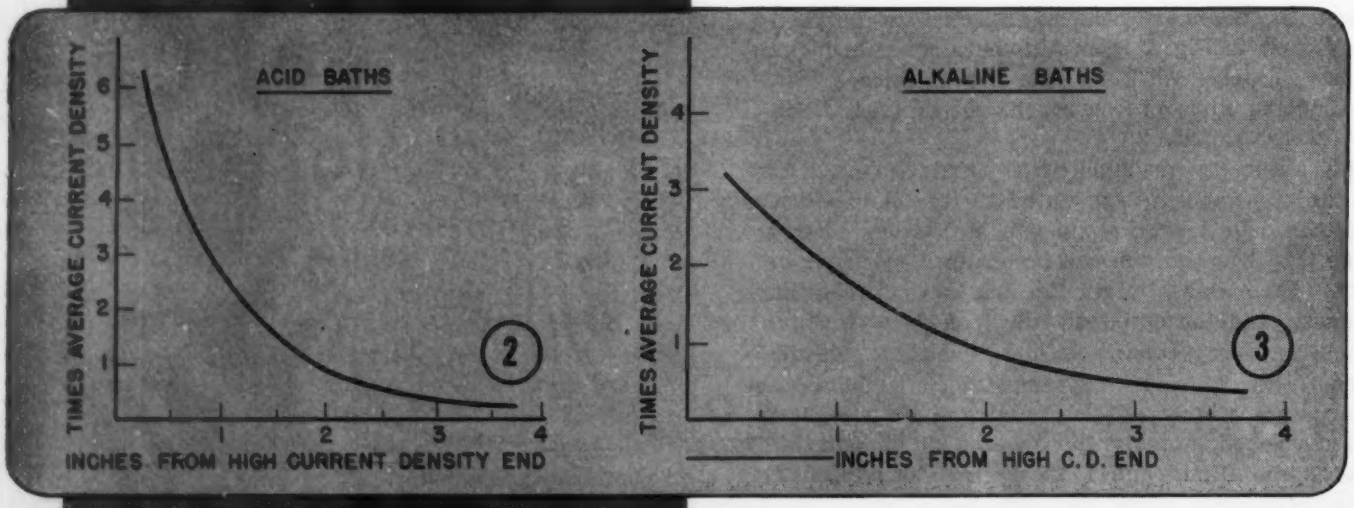
As current density of a bath is increased, a point is reached where the cathode begins to gas or the plate becomes rough, porous, nodular or spongy. This is known as the limiting current density and is generally increased by any means that increases supply of metal to the cathode. For instance the limiting current density in most baths may be increased by increase in metal content, by increase in temperature or by agitation. This is particularly true in the acid baths and is often limited in some of the cyanide baths by the cyanide content.

Plating range of a bath lies between the minimum current density at which the metal covers satisfactorily and the limiting current density. The plating range then is a complex property of the bath, depending on many bath variables, but if the plating range and the plating rate of a bath can be controlled, it is all that is necessary for successful bath operation. In fact, when a bath is (*Please turn to Page* 118)

Fig. 1—(*a*) *Immersion and* (*b*) *box type slot type plating range cells*

Fig. 2—*Calibrations for average conditions of acid baths with* 4-*inch cathode*

Fig. 3—*Calibrations for average conditions of alkaline baths with* 4-*inch cathode*



Seen and Heard in the Machinery Field

By GUY HUBBARD
Machine Tool Editor

FROM WOOD TO METAL: Woodworking still has its place in the mass production of metal products, although in a different way than it did in the day of Eli Whitney when machine tools had wooden frames.

When I picked up the Chicago Tribune, Sunday, October 26, I came across a full page "Progress Report" on a much talked of new automobile. In this was the statement: "Maple body forms—accurate in the minutest details—have been completed in 100 days. A record never before attained by an automotive manufacturer". That refers presumably to the wooden models in which the "tracer fingers" feel their way over in Keller die sinking machines and which are exactly reproduced in the tough die blocks by the fast running cutters controlled by those tracer fingers.

Woodworking is an ancient art which few of us associate with the modern technique of forming and drawing sheet metal. Back of the scenes, however, the skilled woodworker is a highly important factor in motor car production. His skill transmitted to the machine which cuts the dies, is multiplied thousands of times by the presses and so makes possible the mass produced streamlined vehicles now enjoying such widespread popularity.

METALS AND MACHINES: As a fitting prelude to participation in three national conventions, that of the American Gear Manufacturers Association in Chicago, of the American Society of Tool Engineers in Boston, and of the National Tool and Die Manufacturers Association in Philadelphia, I spent two days at the National Metal Exposition in Chicago.

My visit to the Metal Show served to remind me forcibly how much of the recent and rapid progress in industry rests solidly on the foundation built by metallurgists in the last few years. Those of us who are concerned primarily with the use of metals in machinery construction in tools for working metals and in the manufacture of consumer goods are altogether too inclined to overlook what the metallurgists are doing for us in basic developments of new alloys and in working out their heat treatment, etc. Perhaps we should use the Metal Show as an occasion to say "thanks for your help, metallurgists!"

Too Many Blacksmith Shop Traditions

As I got to thinking this over, many things came to mind which "couldn't be done" 30 years ago because the metallurgical wherewithall was lacking. Why were our machine tools so heavy and cumbersome?

Largely because we did not have light, strong materials of today, or they were too expensive, or we did not have the metallurgical know-how to make use of them.

Why were our machines such slow running affairs? Largely because we did not have the uniformly dependable high speed steel and cemented carbides of today and because we did not have the metallurgical know-how to get the best results out of the cutting materials which we did have.

Why didn't we have proper metallurgical know-how? Largely because we clung to the myth that blacksmith shop traditions and blacksmith shop equipment and blacksmith shop brains were plenty good enough to take care of the metallurgical needs of any so called "practical" machinery building establishment, and because we clung to the idea that hocus pocus rather than science should prevail in the blacksmith shop. Who were we to laugh at the metallurgy of the ancient alchemists? Ours wasn't much better not so many years ago.

Designer Consults Metallurgists

Today, when the designer has a problem involving extreme lightness, great strength, extreme heat or what not, he doesn't avoid the issue, he consults with metallurgists. The chances are about ten to one that they will look at the physical requirements and then recommend ready-made metals which will meet them. If not, there is a very good chance that they will find some way of meeting the situation through special treatment of existing metal. If not, that they may develop a new alloy if the cause warrants it.

Archimedes said: "Give me the fulcrum and I will make a lever which will lift the earth!" It truely can be said today that metallurgy is the fulcrum which today enables the engineering profession to get a leverage on problems which they couldn't have budged back in the days when metallurgists were blacksmiths whose capabilities were not allowed to develop and whose equipment was that of Tubal Cain.

A ROMANCE OF INDUSTRY: Just as I was putting finishing touches on this page, a letter came in from Sidney Little, advertising manager, Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., with a brochure entitled, "Dedicated to Performance".

Two pages of this interesting 32-page book are devoted to the story of how a shop established in 1859 in what then were the backwoods of Wisconsin, has in 88 years grown from an obscure source of saw mill and grist mill equipment to be the world's largest manufacturer of horizontal boring, drilling and milling machines.

Much of this progress has taken place since Hans Kraut came into the picture in 1924. He is one of my favorite machine tool men. Everytime I study his career, my faith in America as a land of opportunity is renewed.

Typical applications of compressed air and gas, representative types of compressor installations, air-operated portable tools and accessories are described here

"Harnessed" IN THE METALWORKING

Fig. 1—Pneumatic bench type sand rammer ramming sand in small flask at bench height. This tool weighs 14 pounds

Fig. 2—Impact wrench used in assembly of drive wheel for an industrial truck

Fig. 3—Cutting action of percussion tool is shown in this illustration of a No. 2 chipper at work in a boiler shop. Tool is started and stopped by pressure on trigger in man's right hand

Fig. 4—Duplex two-stage compressor direct-connected with synchronous motor on shaft, installed at copper mine

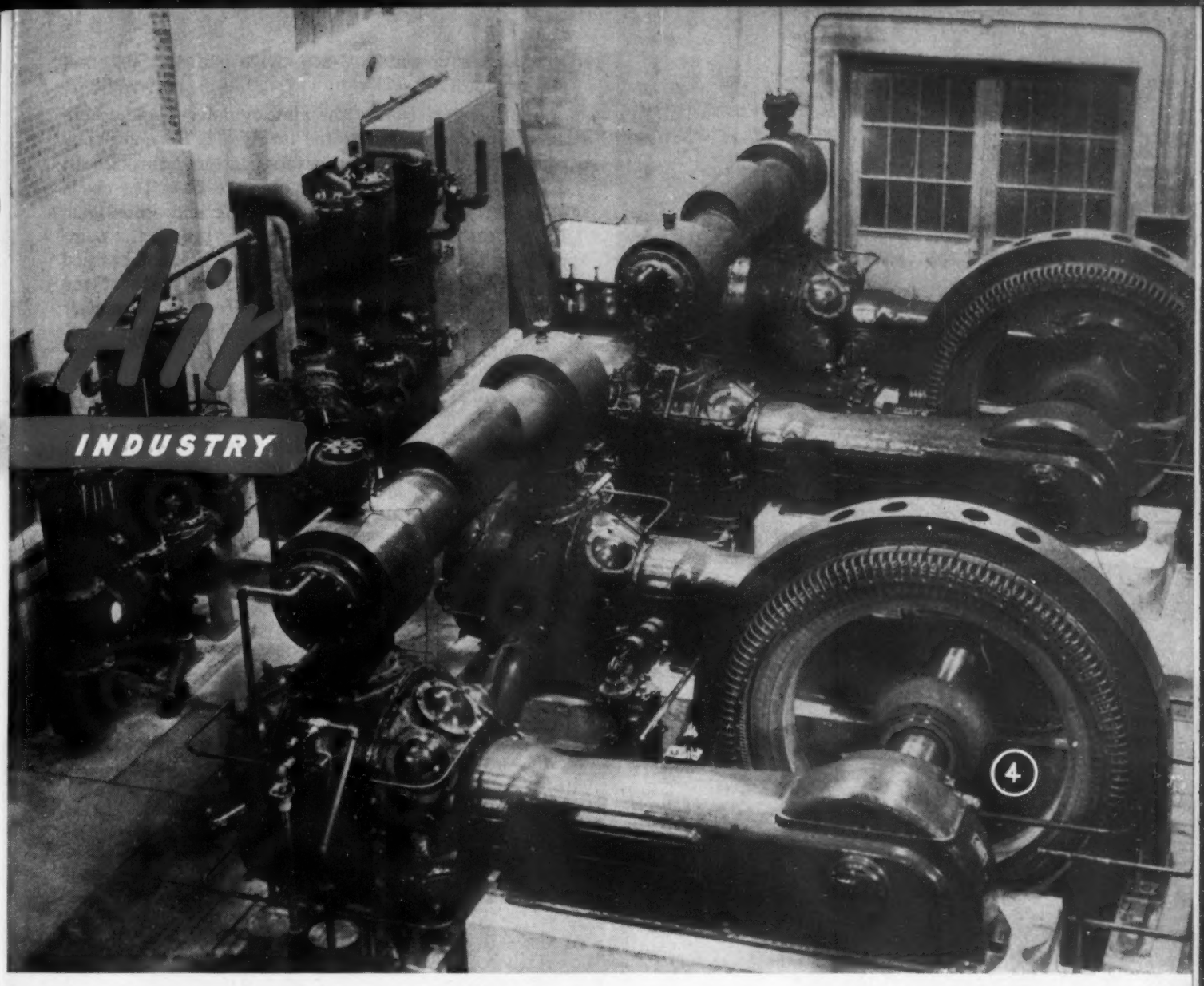
PRODUCTION of metals and the machines which work them into finished products is a vast field of industry. In the countless processes from molten metal to the finished product, compressed air performs a highly useful role, sometimes in a minor way, and sometimes as the essential factor in the process. Wrist watches or washing machines, bolts or battleships, whatever the product, compressed air contributes in some way to its completion.

Bessemer process for making steel calls for huge quantities of low-pressure air for aerating metal. Pneumatic tools are used around the mill for chipping and grinding billets, as well as for tapping blast furnaces. Smelters and ore mills use air hoists and lifts, agitate cyanide solutions with compressed air, and clean cyanide tanks by sandblast. Caulking tanks, operating converter tamping machines and handling solutions are a few other typical applications.

Use of air jets to keep cutting clear from tools is probably the most common of all applications for compressed air in the operation of machines. The same principle is applied automatically to other machine operations, such as the one illustrated in Fig. 5. There are any number of variations of the same idea.

Air chucks on lathes, milling machines and other machine tools reduce the time required to insert and remove pieces of work. Air-chucks are commonly used instead of the slower manual tightening of work when the cutting time is brief and high production rates are essential. Two machine tool applications for compressed air are shown in Fig. 10. Air motors and air pistons are applied in many other ways also, to bring work to the tool or tool to the work.

The foundry industry puts compressed air to work in numerous ways. The typical foundry scene in Fig. 12 shows a few of the uses of air. Sand rammers, molding machines, sand sifters, several types of vibrators and clamps for holding work are air-operated. Air hoists and lifts assist in handling work. Pneumatic hammers, drills and grinders are used in different operations. Castings are cleaned by air sandblasting or by air-operated wire power brushes. Machines and cores are cleaned by blowing off with air. Compressed air is indispensable in a foundry.



Forerunners of modern air compressors first appeared around the time of the Civil war, although notable advances had been made before then over the wooden cylinder and piston used 4000 years ago to produce air blasts.

In the reign of the Ptolemies, Ctesibius of Alexandria invented a tube out of which an arrow was shot by compressed air. One of his pupils, Hero of Alexandria, gained knowledge of the influence of heat in expanding and contracting air. Rather than applying this knowledge to freeing man from arduous tasks, Hero showed the priests of his time, around 150 B. C., how to mystify and awe people by opening and closing temple doors with compressed air. It is centuries later that further progress in harnessing air power is recorded.

Future for compressed air and gas, as we know it today, was dramatically unfolded on the Mount Cenis tunnel, first connecting link in the Alps between the railway systems of France and Italy. Construction of the 8-mile tunnel started in 1857; its completion did not look promising as the work proceeded at the discouraging rate of 1.5 feet per day. However, a water-power-driven machine for compressing air was brought to the project in 1861 and replaced manpower in driving the drills. With this innovation, the work on the tunnel was speeded up to 4.75 feet per day.

First compressor used on a large-scale project in the United States was in 1866 on the Hoosac tunnel. It was a 4-cylinder horizontal unit, with single acting cylinders. Pistons were driven by a turbine wheel and air was admitted through poppet valves in the pistons. Water for cooling was injected through inlet valves.

A compressor is a machine for compressing air or gas from an initial intake pressure, usually at normal atmospheric conditions, to a higher discharge pressure. The compressing element may be of the reciprocating type or the rotating type. A general description of representative types of compressors, variations of single types and some representative applications are presented here.

Reciprocating type of compressor, which includes portable air compressors, compresses air by a piston moving back and forth in a cylinder. The multi-cylinder stationary type compressor with built-in motor is widely used in many industries. For example, the air compressors illustrated in Fig. 8 are used in a manufacturing plant to supply air for many of the typical machine operations previously described. This is a dual installation of vertical, two-stage, single-acting air compressors. Each machine has a piston displacement of 285 cubic feet per minute at

100 pounds pressure. V-belt drive is from 50-horsepower motor.

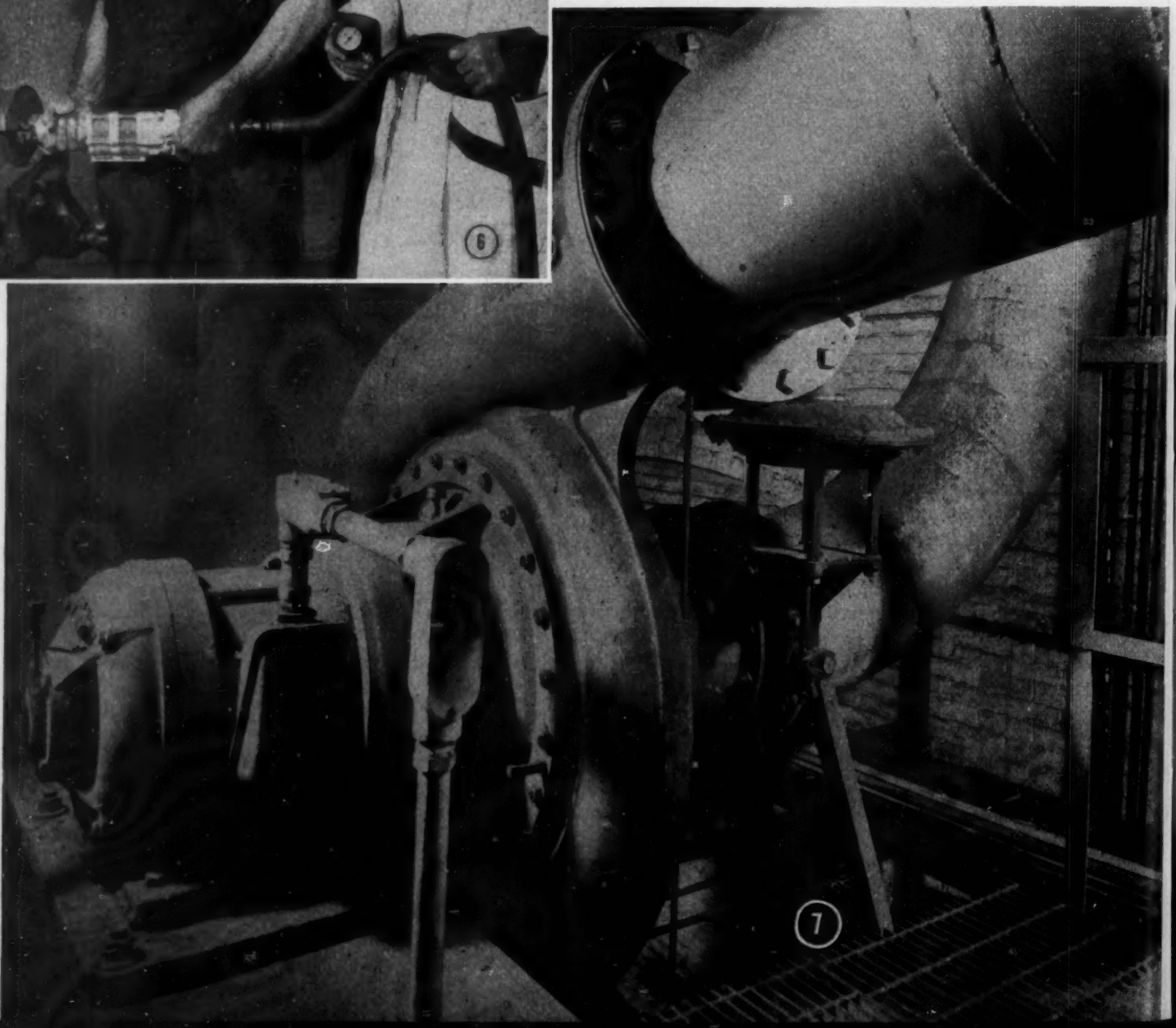
Another variation of the multicylinder single acting air compressor is illustrated in Fig. 11. Here are four of a total of 17 air compressors scattered throughout a large parts manufacturing plant to meet the needs of the grinding, drilling, air chucking and other jobs. In this case, the parts manufacturer placed the compressors close to the work rather than pipe compressed air from one large central plant to all areas of the factory where compressed air is required. Another widely-used type of stationary reciprocating com-

Fig. 5—Each piece punched on this press is ejected by compressed air

Fig. 6—Air gage with hypodermic needle attached is inserted into air hose to read pressure available at tool under load conditions. Hole made by needle is self-closing

Fig. 7—Motor-driven single stage overhung type centrifugal foundry cupola blower with constant air weight control

Fig. 8—Dual installation of multicylinder, two-stage air compressors in a manufacturing plant



pressor is the heavy-duty, straight-line, single-stage, double-acting, steam-driven unit. This type unit can be used to supply compressed air for sand ramming, moulding, vibrating and other heavy needs of a large foundry.

A reciprocating compressor of the duplex, 2-stage, direct connected synchronous motor driven type is the 700-horsepower, horizontal, duplex, 2-stage unit shown in Fig. 4. This representative installation supplies air power at 100-pounds-per-square-inch pressure for many operations in a large copper mine. Air compressors of this type are found on many important operations where large quantities of compressed air are necessary for the daily work of the mine, factory or mill.

Reciprocating compressors vary not only in types and capacities, but also in application. Among these are the duplex, direct-connected, 4-stage compressor and the 2-stage Y compressor, with motor mounted on shaft. This type unit may supply the general compressed air requirements of a sheet metal shop and foundry. Semiradial is still another general type of compressor.

Two general types of compressors are the duplex, 4-cornered, motor-driven compressor with synchronous motor on shaft and the duplex four-cornered steam driven compressor. These machines are found in large steel plants and other installations where large quantities of compressed air are desired for special and general uses.

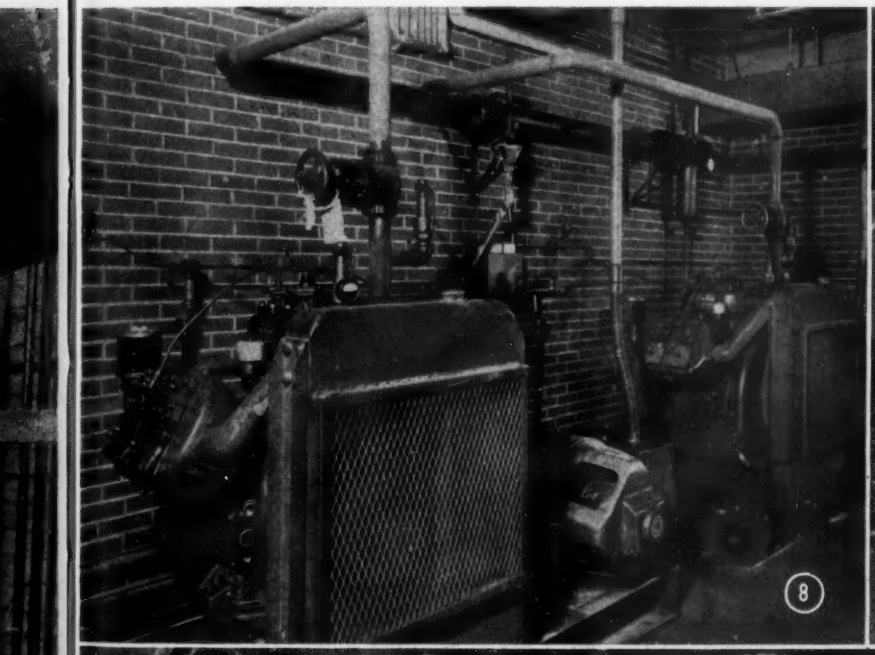
The single horizontal, belt-driven dry vacuum pump is one of the general types of reciprocating vacuum pumps. Another general type is the single horizontal, two-stage dry vacuum pump for higher vacuum.

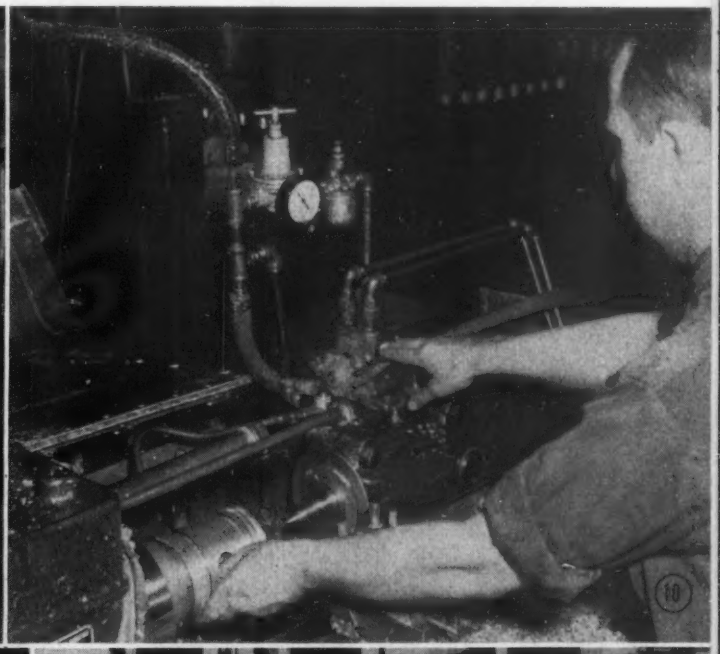
Portable compressors are distinguished from other reciprocating compressors by their mobility. They are complete air compressor plants consisting of compressor, prime mover, air receiver and cooling system all mounted on a chassis. The types of drive for portable

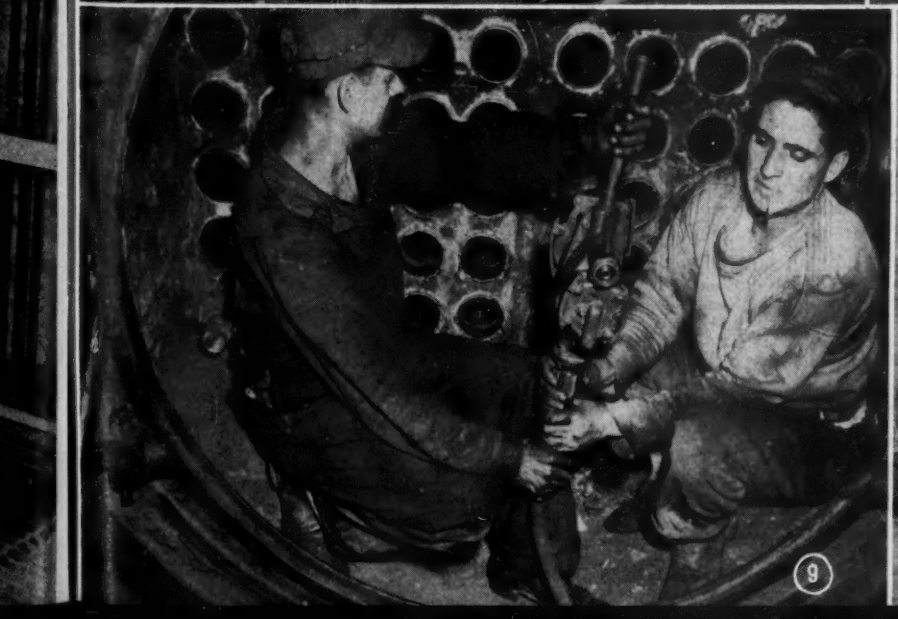
Fig. 9—*Rolling tubes in boiler. This* 26*-pound tool operates a flue rolling device which seals tubes in flue sheets so they can stand pressure. Operator at right controls speed and rolling action by throttle in his right hand*

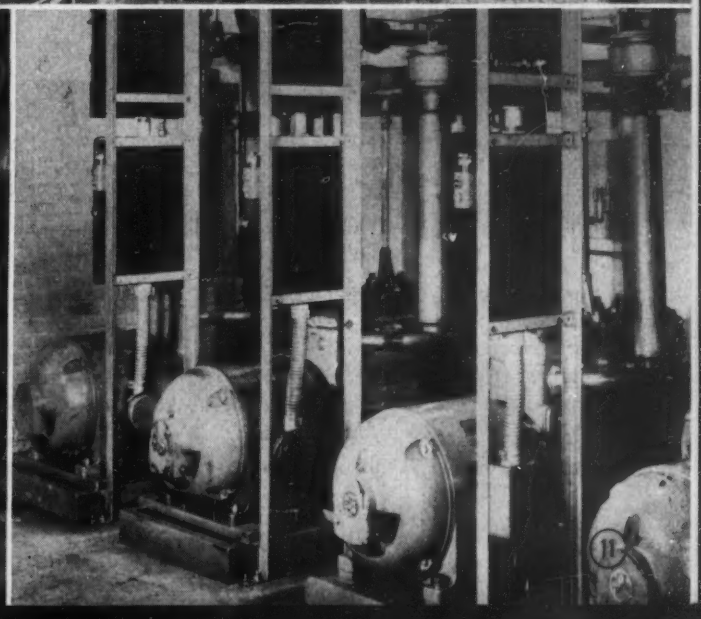
Fig. 10—*Chuck and tail stock on this lathe are air-operated*

Fig. 11—*Multicylinder air compressors are scattered throughout a large metal parts plant for immediate area requirements rather than taking compressed air for entire plant needs from one central air compressor plant*









compressors are commonly gasoline engines, diesel engines, fuel oil engines or electric motors. The portable compressor is essential to the economical and successful accomplishment of work that must be done independent of stationary sources of power.

Ease with which a portable compressor may be taken from one project to another or with which it follows the work as it progresses on one project has added to the usefulness of this equipment. Another important feature is that it is not a "single-purpose" piece of equipment. A portable compressor can, and usually does, power a wide variety of tools and equipment and goes from one location to another where the power capacity requirements vary.

Standard mountings available for portable compressors make it possible to take air power to practically any location, under practically every condition. These distinct types of mountings are: Less running gear or skid mounted; four steel wheels; four pneumatic-tired wheels; two pneumatic tired wheels; four-wheel spring trailer (automotive type front axle and solid or pneumatic tires); ready to mount on truck; trunk-mounted; mine car; rail car.

The rotary sliding-vane compressor is a machine in which longitudinal vanes slide radially in a rotor mounted eccentrically in a cylinder. A single-stage compressor is capable of developing about 50 pounds per square inch gage pressure. Two stages in series are capable of developing up to about 125 pounds per square inch gage pressure. This type is also used extensively as a vacuum pump.

Rotary 2-impeller positive type blower is a machine in which two mating lobed impellers revolve within a cylinder and are prevented from making contact with each other by timing gears mounted outside the cylinder. Single-stage blowers of this type are normally used for pressures up to about 15 pounds per square inch gage. With two stages it is possible to attain pressures up to about 30 pounds per square inch gage. This type of blower is adaptable to volumes from a few cubic feet per minute up to more than 50,000 cubic feet per minute.

The rotary liquid-piston type compressor employs a liquid, usually water, as the compressing medium and has a single moving internal part which is nonlubricated and produces pressure or vacuum. This type of compressor is capable of developing up to 75 pounds per square inch gage pressure in a single stage. It has a range of capacity from a few cubic feet per minute to about 5000 cubic feet per minute.

Centrifugal and axial blowers, compressors and exhausters are machines in which air or gas is compressed by the dynamic action of rotating vanes imparting velocity and pressure to the flowing medium. Single-stage machines may be used for moderate pressures; multistage machines are required for higher pressures. The largest capacity multistage centrifugal blowers in use today are those blowing blast furnaces, the air being used in the burning of coke which heats the iron ore in the process of producing pig iron.

Multistage centrifugal blowers or

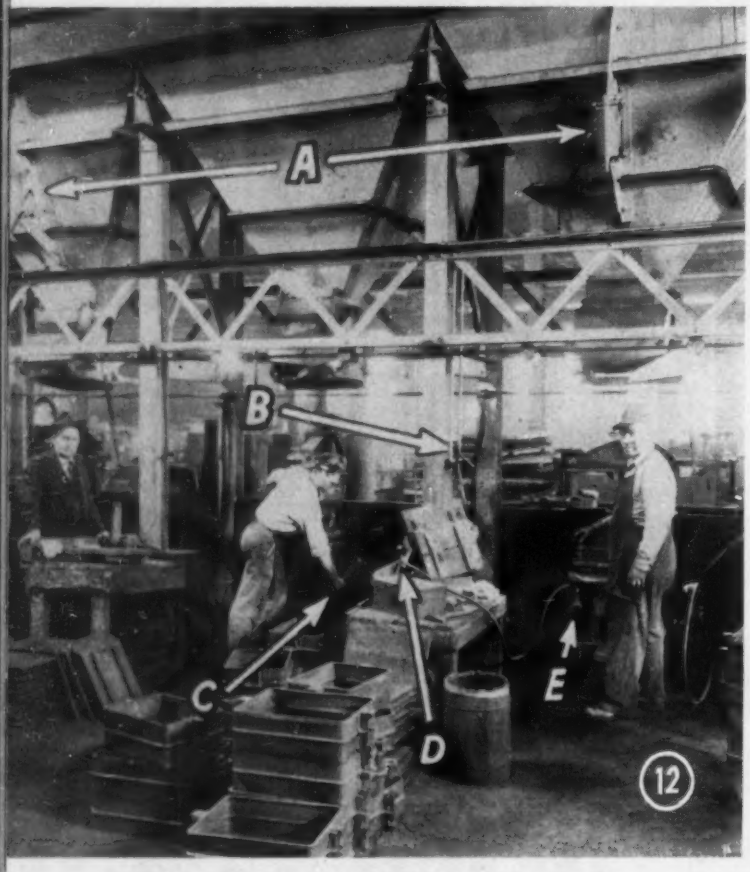


Fig. 12—In this foundry air is used in connection with air-operated jolt-squeezer machines for: A—Air driven bin vibrators; B—valve controlling vibrators; C—valve for operation squeezer; D—air vibrator for vibrating cores out of boxes; E—knee-valve for operating jolt

TABLE I
SPECIFICATIONS FOR ROTARY TYPE DRILLS

Drilling Capacity, Inches	Free RPM For Drilling in Steel	Morse Taper Socket	Air Hose, Inches
5/32	2500-15000 (For very light work)		1/4
3/16	1500-4500		1/4
1/4	1500-3000		1/2
3/8	1000-1500		1/2
9/16	600-1000	No. 1 or No. 2	1/2
7/8	300-500	No. 1 or No. 2	1/2
29/32	450-750	No. 2	3/4
1	450-650	No. 3	3/4
1¼	250-450	No. 3	3/4
2	100-450	No. 4	1
3	75-125	No. 4	1

The above are the average or composite specifications of all manufacturers' most popular sizes.

TABLE II
SPECIFICATIONS FOR CHIPPING HAMMERS

Piston Stroke Inches	Piston Diameter Inches	Length Inches	Weight Pounds	Hose Inches	Work Adapted For
1	5/8	8	3	½	Very light chipping
1⅜	¾	10	5½	½	Light chipping and scaling
1	1⅛	11¼	10	½	Aluminum casting and light cast iron caulking
2	1⅛	13½	13¼	½	Heavy cast iron; light steel casting; flue beading
3	1⅛	14½	14½	½	Heavy steel casting; billet chipping
4	1⅛	15¾	15¼	½	Extra heavy chipping

The above is a composite table of all manufacturers' most popular sizes.

In addition to the above sizes, frequently very small hammers, such as aircraft riveters, are used for very light chipping, peening, etc.

TABLE III
SPECIFICATIONS FOR SAND RAMMERS

Piston Stroke Inches	Piston Diameter Inches	Length Inches	Butt Diameter Inches	Weight Pounds	Hose Inches	Work Adapted For
2	1	13	2	7	½	Bench work
4	1	20½	2½	12¾	½	Bench work
5	1¼	49	3	21½	½	Floor work
6	1½	49	5¾	31	½	Heavy floor work and backfill tamper

The above are average, or composite, specifications of all manufacturers' most popular sizes.

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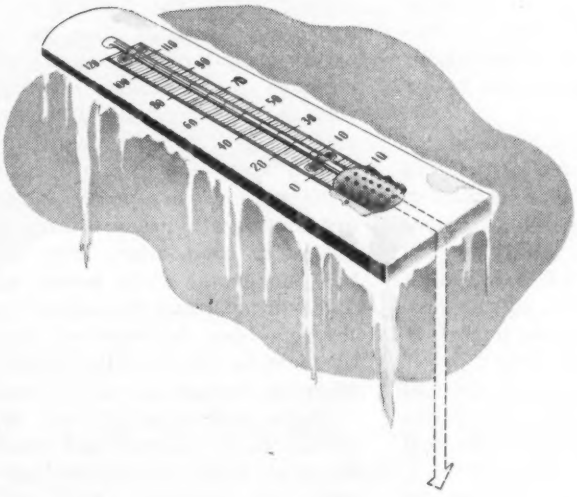

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For example, note the rise in strength, ductility *and* resistance to impact for two copper and brass alloys:

Alloy	Temp. °F.	Tensile Strength, p.s.i.	Elongation % in 2 in.	Impact Resistance, Kg-m per sq. cm.
Electrolytic				
Tough Pitch	68	58,700	8.4	6.6
Copper (Cold Rolled Strip)	-295	64,800	11.2	7.4
Yellow Brass	73	85,400	6.3	8.1
(Cold Rolled Strip)	-295	102,900	10.1	9.4

Other Revere Alloys, such as Herculoy (High-Silicon Bronze, A), show similar improvement in these important mechanical properties.

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compressors are also used in connection with: Catalytic processes in the petroleum and chemical industries; production of oxygen; bessemer converters; copper and nickel converters; coke oven gas exhausting and boosting; manufactured gas boosting; compressing refrigerants. Single-stage centrifugal blowers are used for a large variety of applications.

Fig. 7 shows a typical "overhung" type of single-stage centrifugal blower. With the overhung type, the impeller is mounted on the driver shaft and the over-all length is less than with a comparable pedestal type unit. This particular machine is rated at 5500 cubic feet of air per minute at a pressure of 1.5 pounds per square inch gage and operates at 3550 revolutions per minute. It supplies air to a foundry cupola and includes constant air weight control on the inlet.

Motor driven single-stage centrifugal blowers are available for capacities up to about 60,000 cubic feet per minute and pressures up to 4 pounds per square inch gage or more, at a speed of 3600 revolutions per minute. For still higher pressures, speed increasing gears are required. Direct connected turbine driven single-stage centrifugal blowers are available for pressures up to 7.5 pounds per square inch gage or more. For still larger capacities, double inlet centrifugal blowers may be used.

If the air compressor is to become an integral part of a production process, predetermined factors may dictate the exact type and capacity of compressor to be used. Where the equipment is for general purposes, however, it is well to remember that often it is advisable to obtain some extra capacity over the estimated requirement. This is because most plants using compressed air find new applications for this versatile power after compressors are installed.

The term "pneumatic tools" covers a wide variety of air-operated machinery which is generally carried to the work. Use of compressed air as a power source makes it possible for these tools to be light in weight, powerful, flexible and easy to operate; it speeds up such operations as grinding, buffing, sanding, drilling, riveting, flue rolling, nut setting and screw driving.

Pneumatic tools of the rotating type, such as grinders and drills, remove metal rapidly because of sustained speed under load. High power capacity of the tool provides ample energy to maintain speed under load while free speed is controlled through the use of a governor or other device. When the tool is put to work, the load starts to reduce the speed and the tool is then supplied with additional air to keep cutting action at a high rate.

Importance of obtaining maximum output from tools of all kinds cannot be over-emphasized. This is true because labor is by far the largest item in the total cost of manufactured products. Any reduction in the efficiency of the tools will therefore materially increase the unit cost of production. Maximum output of pneumatic tools requires an ample supply of air at the proper pressure at the tool itself so that the tool can develop full power.

A hypodermic needle attached to an air gage, as shown in Fig. 6, will show the air pressure actually available at the tool. It must be emphasized that the pressure shown at the compressor does not indicate the pressure delivered at the tool itself while the tool is running. Such a test may indicate that only 60 pounds pressure is available at the tool, instead of 90 pounds and, if the condition is remedied, production will be increased from 25 to 50 per cent, provided the tools are in good condition and can deliver the increased power provided by the increased pressure.

Careful consideration must be given also to the size and length of hose to use, for hose can very severely restrict the air pressure delivered to the tool. The size of hose should be as large as practicable and as short as possible. Proper hose recommendations are included in the tables that follow in this section.

Pneumatic Tools: Wide range of pneumatic tools available in different fields suggests careful selection so that maximum output may be obtained with minimum effort by the operator. Obtaining full advantages of pneumatic grinders in cutting production costs involves three important and inter-related steps, viz.: (a) Selecting the correct tool for the job; (b) selecting the correct accessories for the tools; (c) operating the tool at the proper speed.

Selecting the correct grinder for the individual job is highly important, particularly in view of the wide range of tools available, as shown in the following list: Die grinders, straight grinders and buffers, 2, 4, 6 and 8-inch, cone grinders, 2 3/4-inch and smaller, vertical grinders, sanders, wire brushing machines, etc.

Pneumatic tool manufacturers have developed tools with a wide range of power and speeds for the many different applications encountered. They also modify standard types to meet special conditions, even though the field for these semi-standard types may be small. For example, cone grinders are available not only in regular lengths but also in 13-inch and 26-inch extensions where the work requires this added "reach". The user should consult the manufacturer about his special problems.

Air consumption of pneumatic grinders varies with size of tool and nature of work. A modern heavy-duty 6-inch grinder consumes 20 cubic feet of free air per minute while idling, and between 20 and 50 cubic feet per minute under load, the latter representing occasional extreme cases, such as operating a grinding wheel in a corner where the area of contact is high. The actual air consumption, under average load conditions, is usually less than 35 cubic feet per minute.

Modern pneumatic drills are commonly powered by a vane type rotary air motor. A governor or other device controls the free speed, thus preventing racing of the drill point but delivering additional air to the motor as the load is applied, thereby maintaining the necessary high speed. Today's air drills range from 1¼ pound types delivering ¼-horsepower at 10,000 revolutions per minute to drills weighing 175 pounds, delivering 6 horsepower at 20 revolutions per minute.

In designing pneumatic drills special attention is given to safety. Self-closing safety handles are available which stop the drill when the handle is released. Variable speed may be obtained by gradually opening the throttle valve, making it possible to start a difficult operation with controlled speed and power. Pneumatic drills are explosion-proof, an important consideration where there is any danger of combustion. They will not heat under the most severe service and will not cause radio interference. Rotation can be reversed instantly by twisting the throttle without the slightest damage to the mechanism.

Drills and reamers for drilling operations in the steel and wood construction field, locomotive and railroad car building, steel erection, boiler building and erection, boat building, large machinery construction and automobile, refrigerator, truck, aircraft and tractor assembly. Pneumatic drills are also used as reamers for reaming holes for rivets. This is done with the nonreversible light-weight drill. Reaming up to and including 15/16-inch is done with one-man tool. Pneumatic drills of the reversible type are also used for rolling boiler tubes, Fig. 9, with important savings of man power over former hand methods.

Reversible drills are also used for

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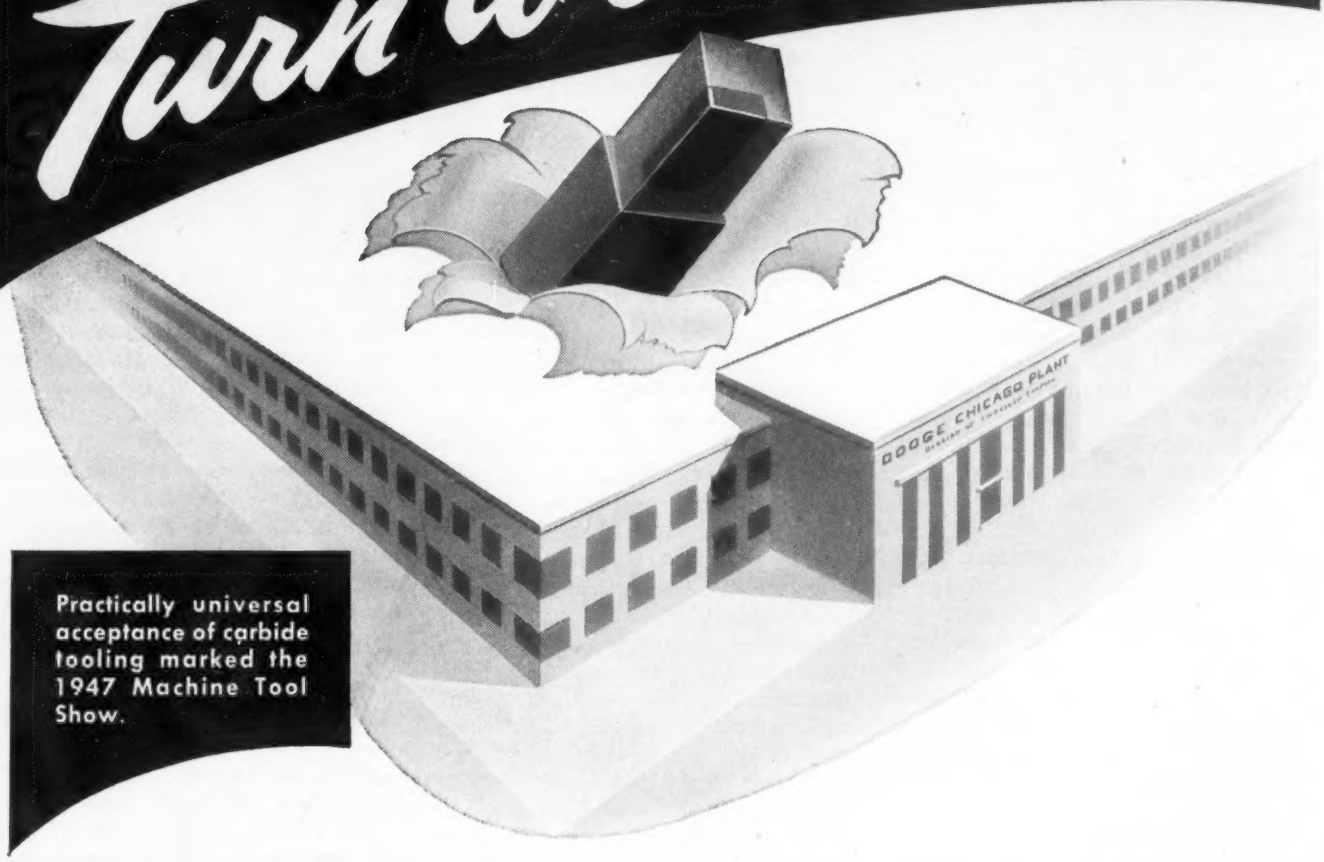

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tapping staybolt holes in boilers. Here again the light weight reduces many two-man operations to one-man operations with increased daily output of holes tapped per machine. Staybolt driving is usually done by the same tool.

Right angle types designed especially for use in close quarters and commonly known as corner drills, are available in capacities of ½-inch to 2 inches and also for extra heavy work. These drills are designed for use in extremely close places where the ordinary drill cannot be operated. Corner drills will drill, ream and tap, and do all the work commonly done by the conventional types of pneumatic drills.

In recent years completely new lines of pneumatic drills have been developed, weighing in general from 1¼ to 3½-pounds. They are easily handled without undue operator fatigue. These tools are available with pistol grip handles or with designs wherein the motor housing serves as a handle. These small drills are also available with 30, 45 or 90 degree fixed angle heads and 360-degree adjustable angle heads. The straight type handle is usually preferred on angle head tools. With these tools, holes may be drilled within 5/16-inch of the inside of a right angle and within an opening that is only 1 inch high.

Smaller types of air drills transform a great many hand operations into power operations, with resulting increases in output per worker per day. In addition, workers like the light weight and ease of handling of these smaller types of air drills. Table I shows the general range of rotary drills for various drilling capacities in steel.

Pneumatic screw drivers and nut setters transform many hand jobs into power jobs because of increase in production, lower operating costs, ease of handling and low maintenance. Thus, for example, the cost of assembly may frequently be halved. They offer the added advantage of uniform tension on screws and nuts and, consequently, a reduction in spoilage.

Tools used for small screw driving and nut setting vary in weight from 1¼ to 3 pounds and offer a choice of convenient operating handles. Power cost is low. Small tools consume an average of less than 10 cubic feet of air per minute with a factor of use approximately 66 per cent. This represents a cost per hour for air of about 2 cents. Adjustable clutches are usually employed and can be set for any desired degree of tightness of the screws and nuts, giving accurate control of the operation and making possible the use of relatively inexperienced operators.

Selection of the correct screw driver or nut setter for the individual job is highly important, because of widely variable conditions encountered. Size and type of screws, including length as well as the diameter, must be considered, together with other design features including type of material. To meet these variable conditions manufacturers provide a wide range of sizes of air motors combined with a variety of clutches such as the single slip, the double slip, the kick-out or adjustable type and "positive clutches". The solution of any particular problem can best be found in consultation with factory-trained service representatives.

Pneumatic Wrenches: These tools are essentially air drills with spindles arranged to accommodate nut running sockets. They deliver a continuous and positive torque and are the most convenient and reliable machines available for many nut running applications. They are light in weight, simple, usually requiring no kick-out or cushion clutches, safe and will not over-heat under load.

Accurate torque limitation is obtained by the selection of the proper tool for the particular application. In operation, the nut is driven until the wrench stalls. As long as the wrench is kept in a reasonable state of repair and the air pressure maintained within reasonable limits, stalling will occur at approximately constant torque. Different torque requirements can be met by varying the air pressure furnished to the tool by means of a pressure regulator. Pneumatic wrenches are provided with long handles, so located as to enable the operator to take the stalling torque of the machine without undue effort.

Machines are available in sizes ranging from units weighing a little over a pound and readily capable of developing a torque of approximately ½-foot-pounds, to machines weighing about 200 pounds and developing a torque exceeding 2000 foot-pounds. They can be furnished with various angle attachments, handle arrangements, and means for suspension.

Pneumatic impact wrenches are designed to tighten or remove nuts by rotary or torsional impacts, Fig. 2. This type of action has the same effect on the nut being driven or removed as would be obtained by using an ordinary hand wrench and striking it with a hammer or sledge. Thus, it is possible to remove large nuts which have become frozen and which could not otherwise be taken off without splitting or burning.

Care should be used in the selection of impact wrench sockets, since the torsional impacts delivered by pneumatic impact wrenches will readily cause failure of the socket unless it is made of special heat treated steel capable of withstanding the greater shock and vibration developed by impact wrenches. Suitable sockets are available from pneumatic tool manufacturers.

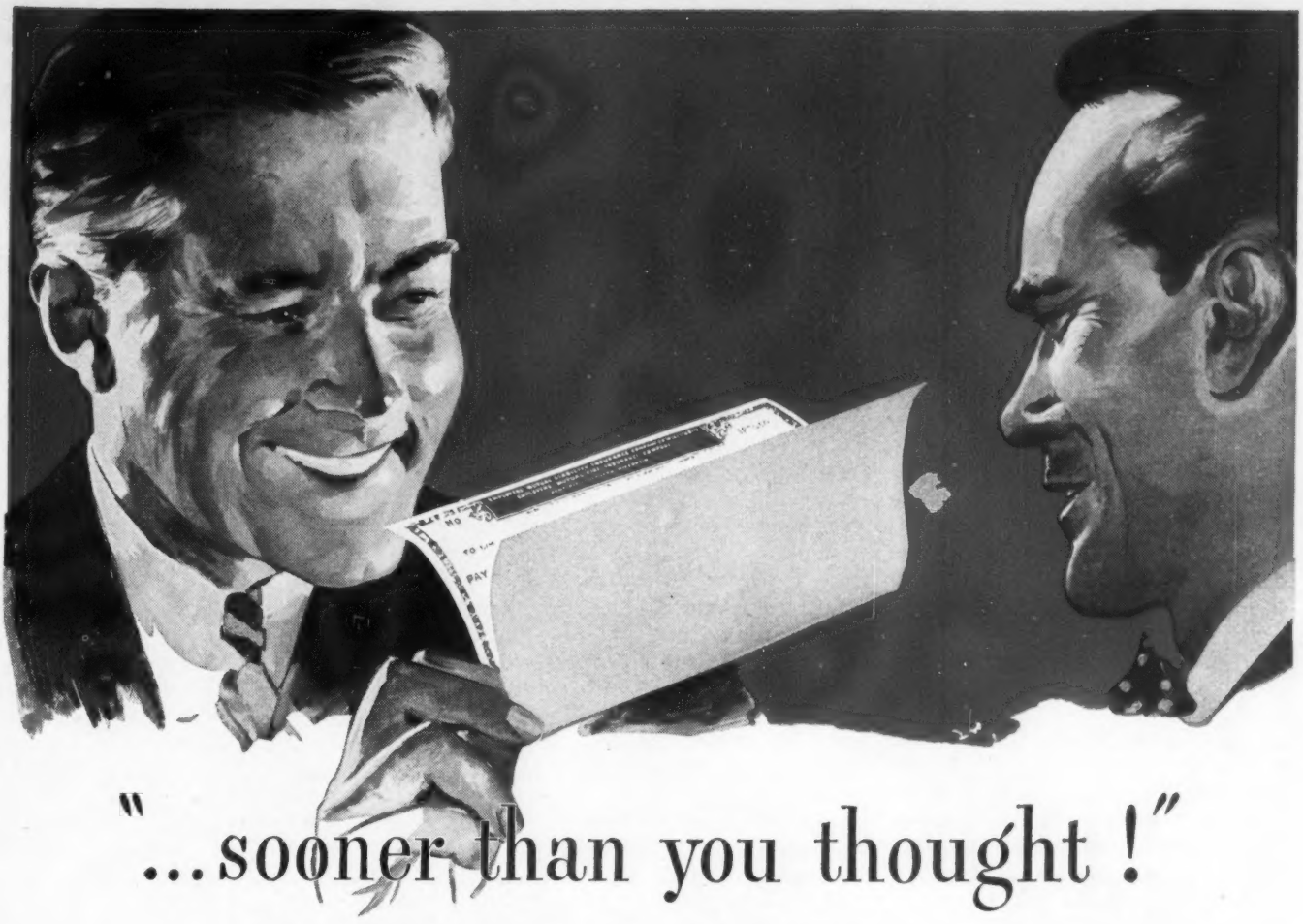
Percussion Tools: Pneumatic chipping, riveting and scaling hammers are percussion tools. They have an air operated piston that delivers a series of blows or percussions to a cutting chisel or forming tool placed in the end of the hammer. There are two general types—the valveless type wherein the piston also acts as a valve for alternately admitting compressed air to and exhausting it from its own two ends; and the valve type, which has a separate valve mechanism for alternately admitting compressed air to and exhausting it from the two ends of the striking piston. The distinguishing characteristic of the valveless tool is its simplicity. The valved type offers greater ease and accuracy of control of the speed and hardness of blow.

In general, valveless tools are used for scaling and similar work where control of the blows is not so important. Valved tools are used for chipping and riveting as this work usually requires control of the blows delivered. All chipping, riveting and scaling hammers have a throttle valve which graduates the air supply so that the hammer may be started slowly if desired and operated at any pace from a slow "tick tick" to a rapid series of heavy blows. The return stroke of the striking piston is always cushioned by compressed air to make the hammer easier to hold.

Most pneumatic tools operate at highest efficiency with compressed air at 90 pounds pressure. If the pressure at the tool drops to 80 pounds, the output of the tool drops about 17 per cent, and if the pressure drops to 60 pounds, the output drops about 50 per cent. Importance of providing adequate pressure for chipping and riveting hammers is obvious when it is considered that if an operator is permitted to use a hammer that is only 50 per cent efficient, one-half of his wages is lost.

Chipping Hammers: Chipping hammers are classed as heavy duty, medium or light, the latter including scalers, caulking and beading tools. Table II shows the many types of chipping castings available. Heavier tools

(*Please turn to Page* 121)



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TECHNICAL PAPERS

. . . presented at the National Metal Congress sessions of American Welding Society, Chicago, week of October 19th

TWENTY-EIGHTH annual meeting of the American Welding Society at Chicago, October 20 to 24 featured 20 technical sessions devoted to 16 classifications of welding research and applications. The following papers, published here in digested form, were among those presented:

Mechanized Inert-Gas Shielded Arc Welding: By H. T. Herbst, The Linde Air Products Co., New York—Inert-gas-shielded arc welding process first introduced commercially during the war for welding magnesium has made rapid strides since the end of the war in entering the field of fabrication of all types of metals. Outstanding characteristic is the fact that, with the exception of copper, flux is not required in welding any of the common commercial metals and alloys.

This paper reports on the proper methods of designing for various applications which have been developed after an intensive program over the past few years.

Precision Pressure Regulation of Various Gases: By J. K. Hamilton, Air Reduction Sales Co., New York —This paper deals with the gas-control phase of various oxyacetylene processes. Means by which the principle process variables, that is heat input and gas-ratio, are used to set up the pressure regulation requirements are covered in considerable detail. Mathematical expressions necessary to accomplish this end are derived.

It is concluded that the gas-ratio is the dominant factor and that, for most purposes, it is sufficient to hold the gas ratio to a total variation of 1 per cent. The paper goes on to list the various primary and secondary causes of regular delivery pressure variations.

Investigation of Steels Removed from Fractured Ships: By G. A. Ellinger and Morgan L. Williams, National Bureau of Standards, Washington—This is a report on examination of ship plates broken in service. Charpy notched bar tests indicated that the plates in which fracture originated were notch sensitive at the fracture temperature. Most of the fractures originated at a structural discontinuity such as a hatch opening corner, or in a faulty weld.

These discontinuities or defects provided notches for the start and progression of failures in notch sensitive materials. Plates in which the fractures ended generally had low notch sensitivities.

Powder Cutting as a Production Tool: By D. H. Fleming, Jr., The Linde Air Products Co., New York — Powder cutting process for stainless steel and the high alloy materials has become firmly established during the past few years as a production tool in the metalworking industry. Process is being used for cutting on the ingot, through the various stages of manufacture to cutting of the finished plate prior to welding.

Recent developments in powder dispensing equipment have permitted further gains over that already obtained particularly in the fabricating field where maximum quality is consistently in demand. This new dispensing equipment makes it possible to cut faster and cleaner than formerly.

Theory of Oxyarc Cutting: By Hallock C. Campbell, Arcos Corp., Philadelphia—Oxyarc cutting is a method of cutting, piercing, and gouging any metal or alloy, using an electric arc and a stream of oxygen both conducted to the point of operation through a flux coated tubular "electrode" or rod.

Mechanism of cutting mild steel follows simple rules based on theoretical temperature distribution curves already published for idealized arc welding conditions. Rate of burn-off of the rod is proportional to the electric current and the cross-sectional area of core, as predicted by theory.

Oxyacetylene Production Cutting in Steel Mills: By W. Begerow and A. H. Yoch, Air Reduction Sales Co., New York—This paper traces the growth of the oxyacetylene cutting torch in the steel mill from the time it was first used as a hand tool for emergency severance of steel to the present time when the cutting torch is in reality steel mill equipment in the production line.

Cutting ingots, blooms and billets at elevated temperatures has opened an entirely new field for the cutting torch in steel mills. Cutting 32-inch diameter alloy ingots, multiple cutting of 28-inch diameter rounds at elevated temperatures, cutting 15-inch diameter rounds for forging slugs, 8-inch square and 6-inch square billets in the roll line are discussed.

Submerged Melt Welding of Low-Alloy and Hardenable Steels: By E. A. Clapp and F. L. Frost, Union Carbide & Carbon Research Laboratories, New York.—Low-alloy steels have presented many problems to the welding and design engineers in the fabrication of welded assemblies of all types. Since these alloys are frequently subject to cracking and may develop excessively high hardness when welded under normal conditions, special welding techniques are required to join these materials.

This paper is a discussion of some of these methods used in the welding low-alloy steels as performed by the Unionmelt submerged melt welding process. Particular emphasis is placed on the control of cooling rate of welded specimens as affected by preheat temperatures and welding conditions.

Design and Construction of Welded Research Laboratory Building: By LaMotte Grover, Air Reduction Sales Co., New York—Current American practices for the design and construction of welded industrial buildings with shop areas are discussed, with particular reference to the welded construction of a new laboratory for

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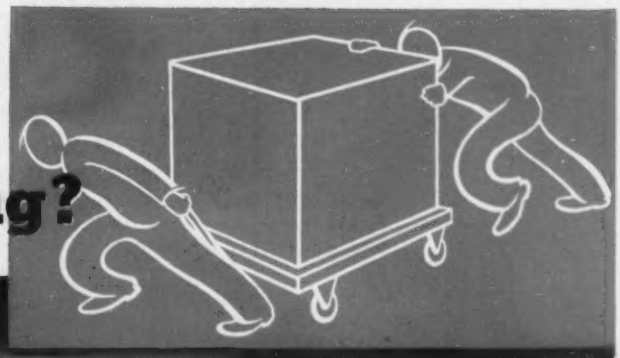

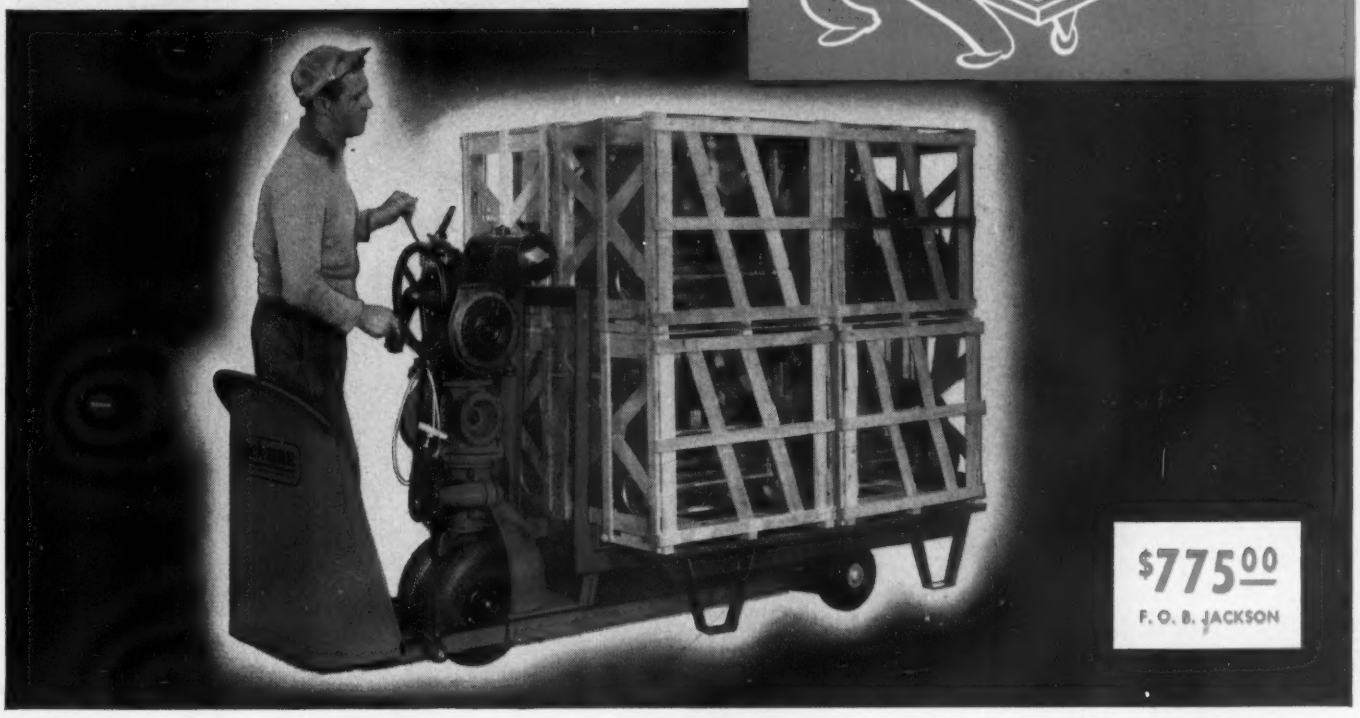

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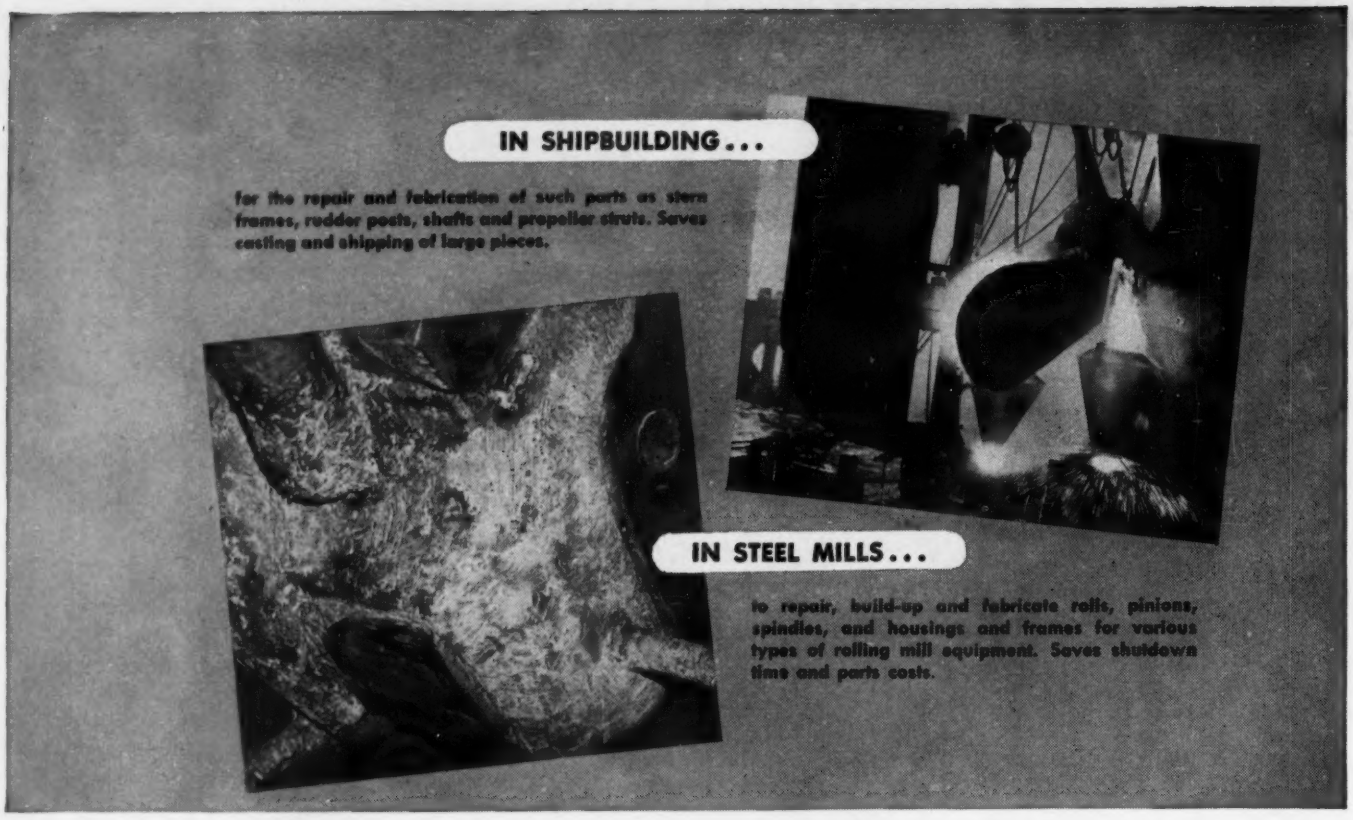
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THERMIT WELDING

apparatus research and engineering, recently built for Air Reduction at New Providence, N. J.

Trends and practices of other countries are compared with American practices for the design and engineering control of materials and construction procedures of welding fabricators and their personnel.

Shape-Welding by the Submerged Melt Welding Process: By J. A. Kratz, The Linde Air Products Co., New York—This paper presents methods of submerged-melt welding in which the direction of the weld changes as the welding proceeds. There are, in general, three kinds of machine welds. Straight-line, circular, and irregular shape. The straight-line weld is the usual type, in which the workpiece moves past the welding head or the head moves along the line of work, as in welding longitudinal seams in tanks.

The second type, circular welds, are made by either of the three following methods: By revolving the workpiece under a stationary head, as in making girth seams on tanks and pipe; by rotating the workpiece on a positioner, as in welding circular flanges; or by causing the head to move in a circle.

Studies on Effect of Red Lead Paints on the Quality of Metal-Arc Welds in Structural Steel: By R. W. Bennett, R. D. Williams, and C. B. Voldrich, Battelle Memorial Institute, Columbus, O.—This paper describes the results of tests to determine the quality of metal-arc welds deposited on steel plates previously painted with several kinds of red lead and zinc chromate priming paints.

In general, the tests indicated that satisfactory welds can be made on structural steel coated with normal shop or field coats (0.001 to 0.002-inch) of the various paints. Under these conditions, the welds are comparable in quality to welds on unpainted steel.

New Applications of Inert-Arc Welding: By R. W. Tuthill, General Electric Co., Schenectady, N. Y.—Purpose of this paper is to clarify the application engineering fundamentals involved in inert arc welding and to show how these fundamentals have been used in practical applications of this process.

Concentrated heat in the arc area, elimination of the need for flux, the compact equipment used, and the fact that the welding operation prevents oxidation of the work are all items to be considered when applying this process.

Stud Welding: By R. C. Singleton, Nelson Sales Corp., Lorain, O.—Semi-automatic electric arc welding process for end welding studs is as fundamental in principle as arc welding itself. In this latest process to gain prominence in the welding industry heat is developed by automatically drawing an arc between the stud (electrode) and the plate (work) to which it is to be welded.

The present stud gun is a completely versatile tool, capable of end welding studs of various sizes and shapes from ⅛ to ¾-inch in diameter and is available as a portable or fixed unit.

Factors Affecting Weldability of Carbon and Alloy Steels: By C. E. Jackson, K. H. Koopman and C. M. Offenhauer, Union Carbide & Carbon Research Laboratories, New York.—Previous investigations indicated that a relation exists between the transition phenomena and the weldability of steels. The present paper attempts to evaluate in terms of the temperature at which brittle fracture occurs, some of the factors involved in the use of carbon and low-alloy steels for welded structures.

Various criteria which are available for specifying transition behavior are discussed and a new criterion for designating transition temperature is proposed.

Macro-Etching and Photomacrography of Ferritic and Austenitic Welded Joints in Low-Alloy Steel: By O. O. Miller and E. G. Houston, United States Steel Corp., Pittsburgh—Procedures are described for macro-etching and photographing polished sections of welds made with ferritic or austenitic electrodes in base metal of low-alloy steel; these are designed to show the position, size, and macrostructure of weld metal in the several passes and to indicate the various macrostructural zones of the heat-affected region of base metal.

Emphasis is placed on light macro-etching of a highly polished surface because frequently much of value is lost by heavy macro-etching of a roughly ground surface.

Failure in Ship Plate and Its Correlation with Large Scale Plate Tests: By Noah A. Kahn and Emil A. Imbembo, New York Naval Shipyard—This paper deals with the development of a laboratory scale test method capable of evaluating the susceptibility of ship plate to brittle, or cleavage type fracture and with the correlation of the results of this method with those obtained from large scale internally notched plate posts.

Arc Welding of Copper and Copper-Base Alloys: By F. E. Garriott, Ampco Metal Inc., Milwakee—In this paper, latest developments in welding copper and copper-base alloys, such as the aluminum bronzes, tin bronzes, silicon bronzes and brasses by means of the metallic- and carbon-arc processes are discussed.

Although the information contained in the paper regarding the arc-welding of copper and copper-base alloys is far from complete, in view of the large number of alloys available, it will provide some basic, fundamental principles involved and deposit physical data that may be helpful in stimulating additional research and development efforts in this field of welding.

Static Strength Tests of Fillet Welds on Aluminum Alloy 61S-T Plate: By R. L. Moore, Aluminum Company of America, New Kensington, Pa.—Tests described were undertaken to obtain information on the effect of size of fillet, length of weld, and direction of weld with respect to loading, upon the shear strength of 45-degree fillet welds on aluminum alloy 61S-T plate.

Breaking loads indicated average shearing stresses on the measured throat area of from 16,000 to 24,000 pounds per square inch for metallic-arc welds, tested in the as-welded condition. Weld strengths increased slightly with increasing length of weld and transverse or end-fillet welds were somewhat stronger than longitudinal or side welds.

Shunt Circuit Impedance in Spot Welding ⅛, ¼, and ½-inch Mild Steel: By Robert Blair, The Taylor-Winfield Corp., Warren, O.—This paper contains quantitative measurements of shunt path impedance in spot welding mild steel on 60 cycle current as well as direct current. Contrary to the direct current impedances, the 60 cycle impedances are quite complex and their relationship to such factors as welder impedance, electrode voltage, sheet width, spot spacing, sheet thickness, sheet temperature, and relative position of the shunt path with respect to the welder throat is explained in easily understandable terms.

Some Metallurgical Aspects of Carbon Steel Spot Welding: By Julius

Heuschkel, Westinghouse Research Laboratories, East Pittsburgh, Pa.—Making and physical testing of spot welds does not, by itself, provide a proper understanding of the various phenomena involved in the application of this process. Information on heat flow and the resulting quench rates was needed.

Influence of the unwelded properties of the base metal upon both the ductility and the strength of the completed weld was studied. Early failures of the thinner, low carbon cold rolled steel welds was found to be related to the lack of local plasticity. The higher the degree of stress concentrations the more important this factor becomes. Cross correlations to results obtained from fusion welding tests demonstrate this phenomena to be common to both types of processes but to a somewhat different degree.

Engineering Symposium of Future Control of Resistance-Welding Machine: By C. E. Smith, Taylor-Winfield Corp., Warren, O.—This paper is in the form of a general description of the present and near future of resistance welding controls. The present type of alternating current single-phase control and its auxiliary equipment such as current compensators and voltage regulators is given consideration along with the needs for present improvement of this type of control.

Power factor correction such as series capacitors on a single-phase alternating current, its benefits and disadvantages are also commented upon. The frequency converter system as outlined, and its application to resistance welding and resistance welding machine is given consideration along with the direct current converter type.

Welding and Fabrication of High-Temperature Alloys: By C. G. Chisholm, Haynes Stellite Co., Kokomo, Ind.—The paper describes techniques used to hot-work the wrought alloys A, B, and C, by forging, hot pressing, and upsetting. It also describes techniques to cold-work the materials by press forming, drawing, spinning, stretch forming, drop hammering, punching, drilling, sawing, and shearing.

Joining processes applied to the cast and wrought alloys, such as resistance welding (spot, roller seam, and flash), metallic arc, atomic hydrogen, heliarc, oxy-acetylene, and brazing, are described in detail.

Some Factors Controlling the Ductility of 25 Cr-20 Ni Weld Deposits: By O. R. Carpenter and N. C. Jessen, Babcock & Wilcox Co., New York—The investigation reported in this paper represents a study of the effect of welding technique and core wire analysis on the ductility of 25 per cent Cr-20 per cent Ni weld metal deposits. The physical properties of weld metal produced under controlled conditions of current and welding procedure using electrodes made from various heats of core wire are determined in an effort to outline the conditions required for the deposition of sound weld metal.

Selection of Austenitic Electrodes for Welding Dissimilar Metals: By Anton L. Schaeffler, Arcos Corp., Philadelphia — Chromium-nickel austenitic electrodes have been used for joining many dissimilar metals. Several authors have discussed the welding of dissimilar metals from chemical, physical and structural viewpoints, but none of them has shown the relation existing between the various compositions of electrodes and the relation of electrode to base metal. It is the purpose of the present paper to reveal these relationships by using the Maurer microstructure diagram, which is commonly used to illustrate microstructures of wrought stainless alloys.

A method of predicting resultant weld metal properties when welding dissimilar metals is proposed. The method utilizes an innovation called dilution direction lines to predict the resulting weld composition and microstructure. Eighteen examples are presented as proof that the method is feasible.

Low Temperature Charpy Tests of Various Ferritic Weld Deposits: By W. B. Bunn, The M. W. Kellogg Co., Jersey City, N. J.—A series of Charpy notched bar tests of ferritic weld metal at temperatures of +70 to −150° F reveals that the covering composition has a definite influence on room temperature charpy values and especially on the transition to brittle fracture temperature.

Data indicate that the refinement of weld structure by multiple layer welding lowers the transition temperature as does thermal stress relief.

Metallurgical Properties of High Yield Strength Seamless Line Pipe: By A. B. Wilder and J. D. Tyson, National Tube Co., Pittsburgh—This investigation involves a study of the properties of a new grade of seamless line pipe with a 52,000 pounds per square inch minimum yield strength and minimum tensile strength of 75,000 pounds per square inch. Line pipe of this type has many commercial advantages when compared to lower yield strength material.

Due to the fact that current practice in the manufacture of seamless line pipe has been limited to 0.30 maximum carbon, 1.25 maximum manganese with a minimum yield strength of 42,000 pounds per square inch, the production and use in the field of seamless pipe with a minimum yield strength of 52,000 pounds per square inch involves a number of technical problems which are discussed in this investigation.

Multi-Flame Pressure Welding Process: By N. H. Cuke, Canadian Liquid Air Co. Ltd., Montreal, Canada—The "Simide Process" is a new welding process for producing homogeneous, high quality butt welds in steel plates. Welds are produced without filler rod by a combination of pressure and oxy-acetylene fusion.

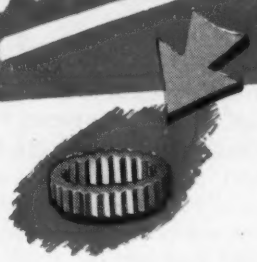
Most of the practical applications up to the present time have been on plate thicknesses in the vicinity of ⅛-inch. Although it appears that there is a minimum and a maximum limit to the plate thickness that may be welded successfully, sufficient research has not as yet been conducted to determine these limits.

Controlled Low-Temperature Stress-Relieving of Welded Tanks for Wet Seal Gas Holders: By R. Kraus, Stacey Bros. Gas Construction Co.—The API and the AWS code for water storage tanks impose a limit of 1½ inches on the wall thickness of the tank plates. For welded gas holders up to 5 million cubic feet it was possible to remain within the limit of plate thickness.

After observation on 2-inch test-plates in the shop had proved consistently satisfactory, advantage was taken of the API-ASME code, which permits a higher weld efficiency for stress relieving and radiographing.

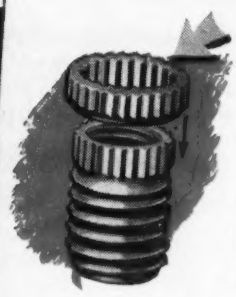
Composite Alloy Fabrication with the Hidden Arc: By H. E. Cable, Lincoln Electric Co., Cleveland—Soon after the introduction of the hidden arc welding process on a commercial scale it was discovered that the ordinary mild steel electrode and standard flux could be used very successfully to weld together steels of poor weldability without preheat, at high speeds and with a minimum of distortion. This phenomenon is due in

This ring LOCKS Inserts or Studs to Parent Materials



Rosán Locking System prevents loosening or turning—even under vibration

Studs and inserts become an integral part of the parent material with the Rosán Locking System. A ring, serrated both inside and out, locks its inner teeth with the mated collar on the stud or insert, and the outer teeth broach their way into the parent material. Result—a completely permanent installation that can't loosen or turn—yet can be removed easily, if desired, without injuring the parent material.



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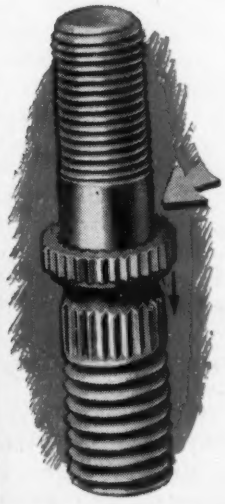
This threaded steel hole can be removed easily with an ordinary drill and any simple wedging tool—and replaced easily—without disturbing the parent material.



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Rosán Studs . . . can't loosen or turn—even under vibration—because the serrated ring locks the stud to the parent material. Rosán Studs can be removed and replaced easily—with simple tools.

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some measure to the exclusion of hydrogen from the molten pool. This discovery has been applied in a number of cases but can undoubtedly be advantageously used for many other requirements.

Semiautomatic Welding with Standard Manual Arc Welding Equipment: By F. W. Myers, Jr., Watertown Arsenal, Watertown, Mass.—This new semiautomatic welding process was discovered in Germany in 1945 by the author, who as a captain, U. S. Army, was serving as Chief of the Army Transportation Corps Technical Intelligence, operating in the ETO.

Object of the investigation conducted at the laboratory of Watertown Arsenal was to investigate the physical properties of welds and the general operating characteristics of the German invention, as compared to standard U. S. manual and automatic welding methods.

Determination of Physical Chemical Factors in Stress Corrosion Cracking of Mild Steel: By H. J. McDonald and M. G. Winterstein, Illinois Institute of Technology, Chicago—During the past two years, as a result of work done in the Corrosion Research Laboratory, a generalized theory of stress corrosion has been developed. The theory states that the rate and direction of growth of a crack depends on the localized electrochemical conditon which is induced by mechanical forces. For mild steel it has been shown that nitrogen dissolved in the steel is responsible for cracking, due to the stress accelerated precipitation of iron nitride, Fe_4N, at the grain boundaries.

Distribution of Strength and Ductility in Welded Steel Plate as Revealed by the Static Notch Bar Tensile Test: By W. F. Brown Jr., L. J. Ebert and G. Sachs, Case School of Applied Science, Cleveland—This investigation is primarily concerned with the distribution of mechanical properties across both hand and machine arc welded one thick mild steel plate. The static notched bar tensile test was selected for this purpose since it subjects a definite structural region to a combination of the severe embrittling factors (multiaxial stress and high initial stress concentration) associated with a sharp "V" notch.

It was found possible by means of the eccentric and concentric notch bar tensile test to reveal variations in strength and ductility across the plate at room temperature. The magnitude of such variations depends on the welding technique and the subsequent thermal treatment of the plate.

Flame Hardening Locomotive Brake and Spring Rigging Pins and Bushings: By B. W. Covell, Northern Pacific Railway Co., St. Paul—Necessary requirements for correct flame hardening depends upon quality of material, proper equipment and trained operators. The advantages of flame hardening are time saved, compared with pack hardening for small quantities of parts, controlled depth of hardening and elimination of localized hardness.

Hardening Railends and Open Hearth Frogs: By R. W. Torbert, Oxweld Railroad Service Co.—The end hardening of railroad rails has been developed successfully to such a degree that it is an important factor in rail maintenance. More recently this economy has resulted in investigation and development of a satisfactory method of flame hardening open hearth frogs.

Flame hardening open hearth frogs is a logical development as a result of the successful treatment of the railends. Preliminary experiments, however, overlooked one of the important factors in the flame hardening of railends. Present practice consists of flame hardening the frogs in a water bath and treating the points of maximum wear in such a manner as to provide uniform wear throughout frog.

New Developments in Railroad Maintenance-of-Way Work: By C. A. Daley, Air Reduction Sales Co., New York.—Proper procedure in building up a wheel burn is to wash out defective metal with a welding torch or a gouging tip with a minimum amount of heat input. If a fracture is observed, metal should be washed out to the bottom of the fracture, provided the fracture is not too extensive. If the fracture is extensive, the rail should be removed.

Paper also discussed flow hardening open hearth steel frogs, flame shortening of eyebar members of truss bridges to equalize stresses, flame tempering corrugated rails, flame crowning joint bars, butt welding rails, flame cropping rail.

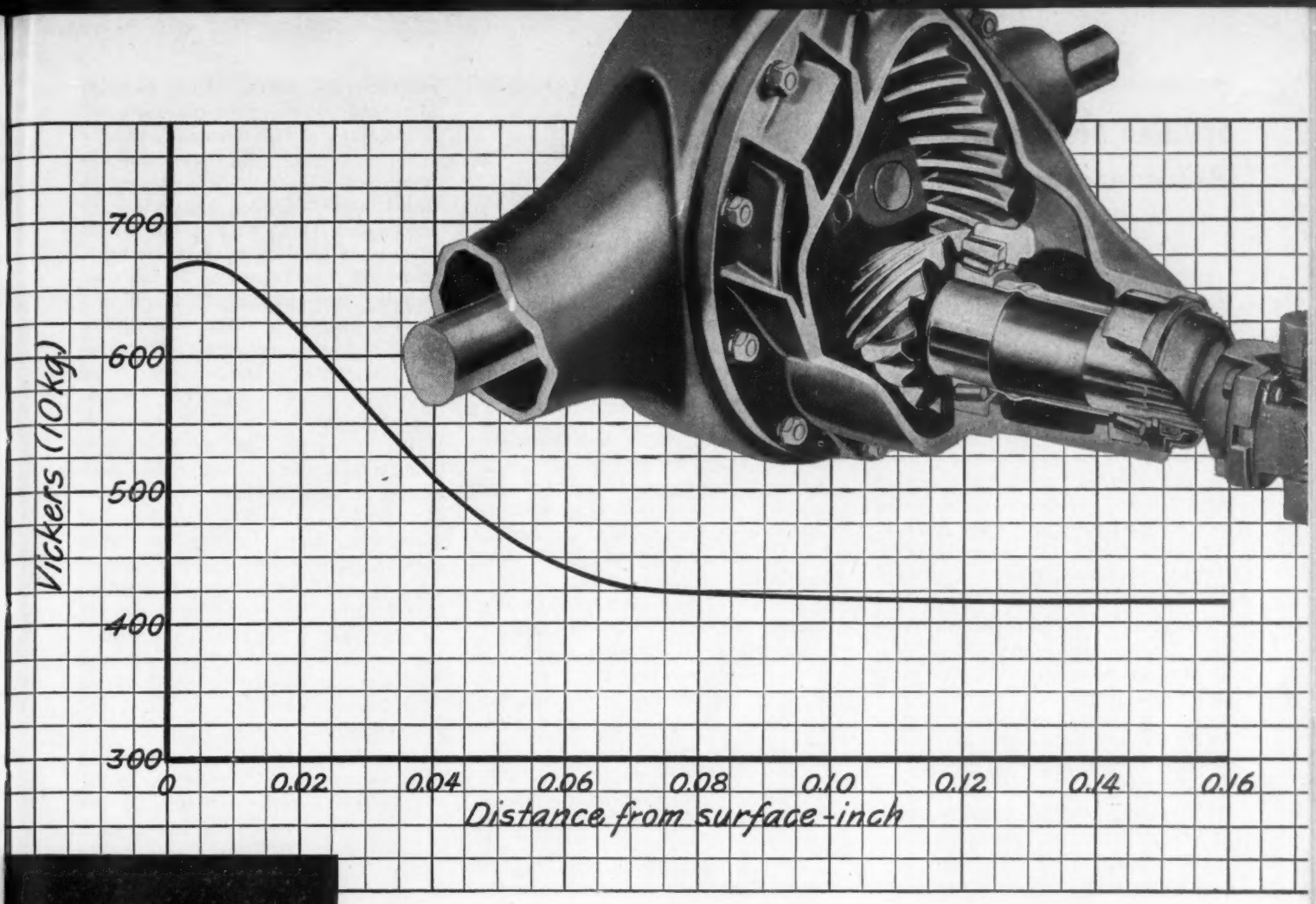
Problems in Resistance Welding Stainless Steel Railway Car Structures: By J. Van den Beemt, The Budd Co., Philadelphia.—The review of problems in welding stainless steel railway car structures outlines the design and sequence of assembly of the major parts of the railway car, namely: Floor, sides, ends, and roof and also reviews certain typical operations in the manufacture of the component parts of truck trailer assemblies. Methods employed are the result of 18 years' experience in welding stainless steel and the problems are encountered in the use of over 700 portable welding tools of widely varying designs, pedestal spot and roller welders, and numerous special purpose automatic welding machines.

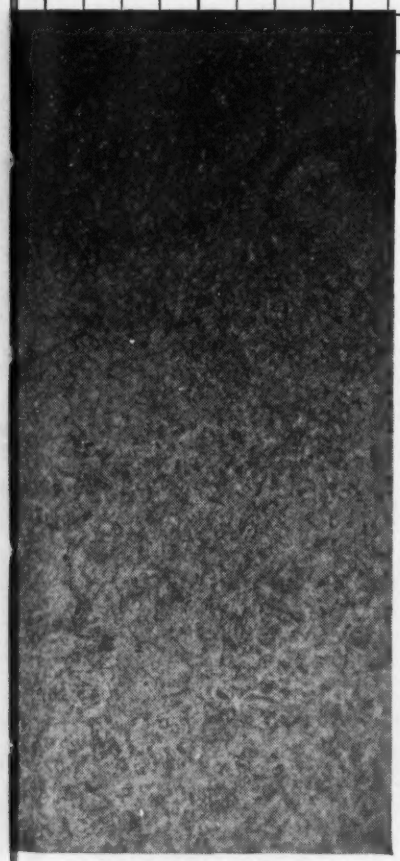
Welding in Assembly Line Production of Refrigerator Cabinets: By P. Bowman, Seeger Refrigerator Co., St. Paul.—Refrigerator cabinets for both household and commercial uses are manufactured by the company. There are three assembly lines, each one for a different type product and with high production per hour on the household, medium production on commercial reach-in cabinets, and low production on the commercial counters. Different types of tooling are dictated by the rate of production and consequently the types of welding vary between the three lines.

Welding of Locomotive-Type High Pressure Boilers: By George M. Trefts, Farrar and Trefts Inc., Buffalo—Principal use of this type of boiler is in the oil fields to supply steam for oil drilling operations. Two to six boilers in a battery are being used depending on the size of the drilling rig. Partially welded construction was introduced some 12 years ago. A few years later boilers with all joints welded came into use and have since given an excellent account of themselves.

Carbon Arc Welding of Copper Pressure Vessels: By John J. Vreeland, Chase Brass & Copper Co., Waterbury, Conn.—Fabrication of copper units, including pressure vessels, for the past few years has presented quite a problem. Copper itself would enjoy a very prominent position in the processing industry field if methods of fabrication could be used which would eliminate the high labor cost with a resulting total cost which would be competitive with other materials. The carbon arc method of welding definitely reduces the overall cost of copper units and this paper deals with the correct procedure for successful fabrication of large vessels.

Directional Welding to Minimize or Eliminate Distortions in Weldments and Control Residual Stresses: By Joseph Holt, consulting engineer, Seattle.—This paper includes a brief discussion on how expansion and contraction caused from welding heat change alignment, impose stresses and cause distortion in weldments.





Photomicrograph (100x) and hardness penetration graph of Chromium-Vanadium A 6120 steel, with a light case (0.80–0.85% carbon) in outer .010 inch.

BONDED FOR LONGER LIFE

The secret of the outstanding strength of carburized parts made of Chromium-Vanadium A 6120 steel is revealed in the above chart. The noteworthy feature is the even slope of the curve, representing the *gradual* decrease in carbon penetration.

There is no sharp dividing line between the case and core—no shell to be shattered by shock or repeated stress. On the contrary, Chromium-Vanadium A 6120 carburizing steel is notable for the firm, well-integrated bond which results from the characteristically uniform decrease in hardness penetration from case to core.

The accompanying photomicrograph is further convincing proof of this exceptional integration or bonding.

For such vital parts as gears, cams, splines, shafts and bearings, the use of A 6120 Chromium-Vanadium carburizing steel assures superior performance and longer service life, in addition to over-all economy.

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Studies Steelmaking Procedures in

All-Basic Open Hearth

USE of basic refractories for all parts of its masonry construction exposed to high temperatures, with the exception of the walls and roofs of the checker chambers, checker brick, floors, bulkheads of the slag pockets, and the roof of the fantails, features a rebuilt 122-ton open-hearth furnace at South Works, Carnegie-Illinois Steel Corp., S. Chicago, Ill.

Designed as an experimental furnace for use under commercial conditions to determine the economic and metallurgical advantages obtainable from a basic lining, it will also be used to study the application of oxygen as a combustion supplement. In addition it will provide an opportunity for comparing the characteristics of various kinds of refractories. Experiments will include the use of oxygen in different kinds of burners, and the use of preheated compressed air for atomization of oil. Studies will be made of flame radiation, effects on furnace efficiency of the higher temperatures permissible with basic linings, and of possible new steelmaking procedures.

All available data relating to the use of basic refractories in open hearth furnace construction were carefully studied and correlated to evolve a furnace design appearing to offer the simplest and safest solution to the various problems inherent in the use of basic brick. By using refractories of the same nominal types, but from different sources, it is intended to compare the characteristics of the several types as influenced by their compositions and methods of manufacture. This part of the investigation was furthered by using similar brick from different sources in comparable parts of the furnace.

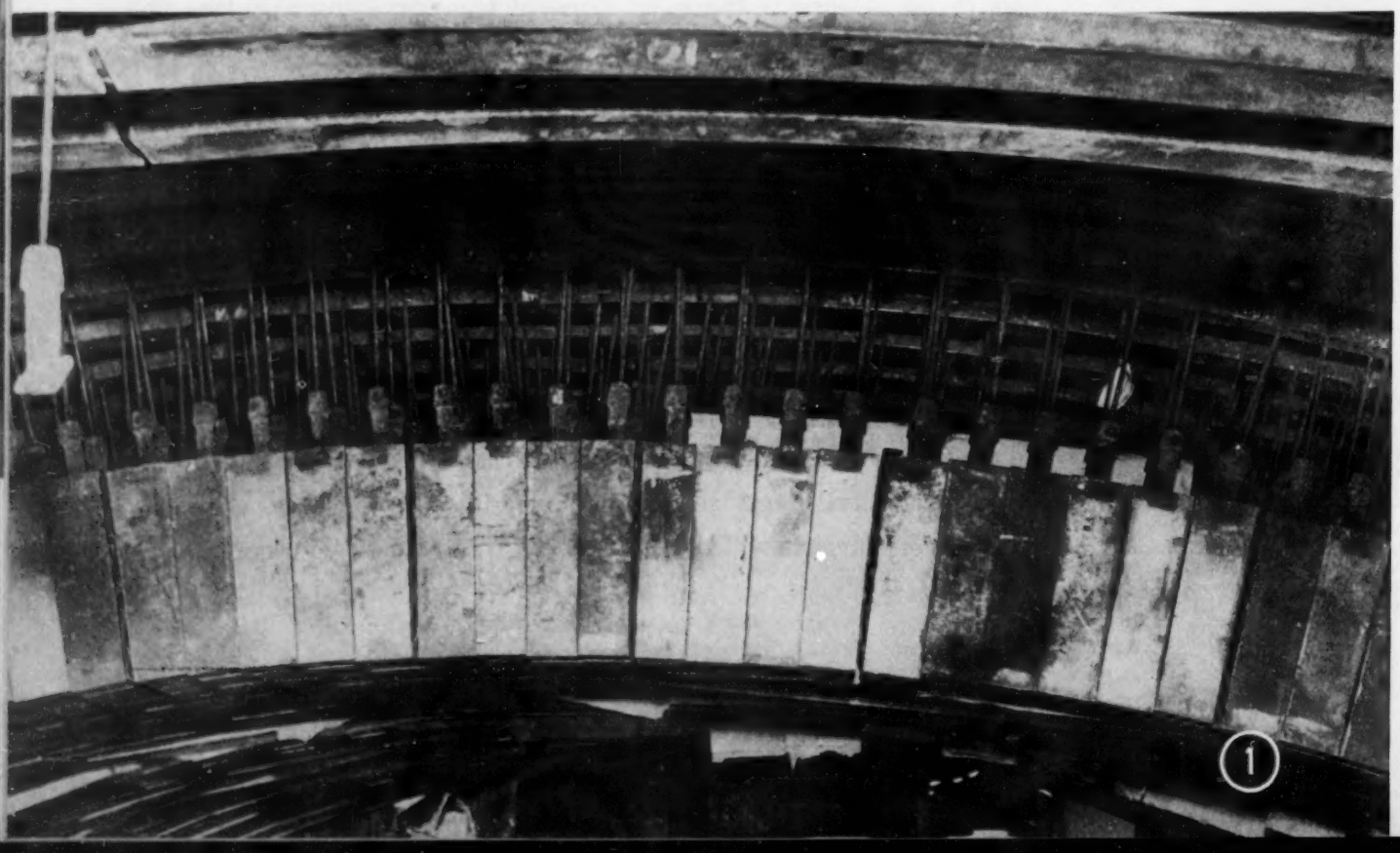
Main dimensions of this experimental furnace are presented in the accompanying table.

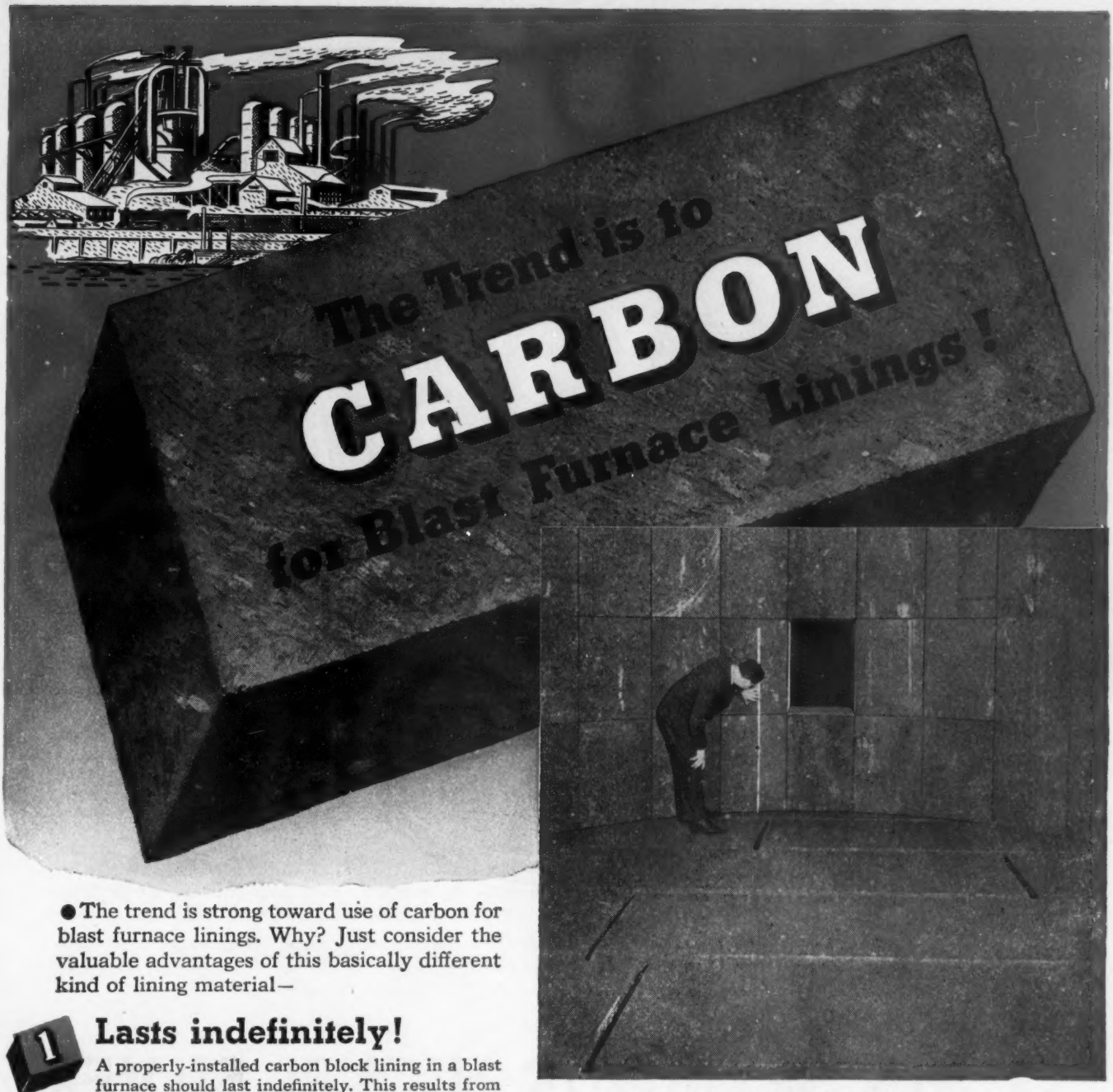
Refractories: Basic refractory brick and shapes used in building the masonry of the furnace were obtained from three independent sources and comprise five kinds. They include: Metal-encased and plain chrome-magnesite brick of the chemically bonded type; burned chrome-magnesite brick, some of which are encased in metal after burning and some intended for use with loose metal plates. In addition to the basic brick there are two grades of firebrick—a double burned superduty brick, and a first quality firebrick. Insulating brick is also employed along with insulating cement and concrete that serve the double purpose of insulating and sealing masonry surfaces.

Roof Construction: Suspended arch construction was adopted for both the main and the port roofs of this furnace. A movable and rotating skewback, backed by springs, takes care of the expansion, contraction, and growth of the roof brick which are different from those of silica roof brick. This is one of the first installations employing both suspension and springs. The main roof was installed 8 inches higher than the silica roof it replaced.

Three types of refractory tile were used in the main and port roofs. At the south end of the furnace, the main roof was built of metal-encased, chemically-bonded chrome-magnesite brick containing approximately 60 per cent magnesite. The port roof at this end was built of a special grade of burned chrome-magnesite tile (45 per cent magnesite) used with loose plates between all bricks. The main roof is 37 feet 8 inches long, knuckle to knuckle, and comprises 128 rings, or courses, of 15-inch

Fig. 1—Main roof arch construction. Each metal hanger accommodates two tiles which can be removed without disturbing roof structure. Corrugated expansion strips provided between groups of tile





Interior of hearth lining looking toward iron notch. Blocks may be of any size desired up to 24x30x180 in.

● The trend is strong toward use of carbon for blast furnace linings. Why? Just consider the valuable advantages of this basically different kind of lining material—

1 Lasts indefinitely!

A properly-installed carbon block lining in a blast furnace should last indefinitely. This results from the remarkable physical properties of carbon: no melting point, low thermal expansion, highly resistant to thermal shock, not wet by molten metals, immune to metal and slag attack, mechanical strength maintained at high temperatures.

2 No Salamander!

Years of experience with carbon linings bears this out. Consider what a saving this feature, alone, can mean to you.

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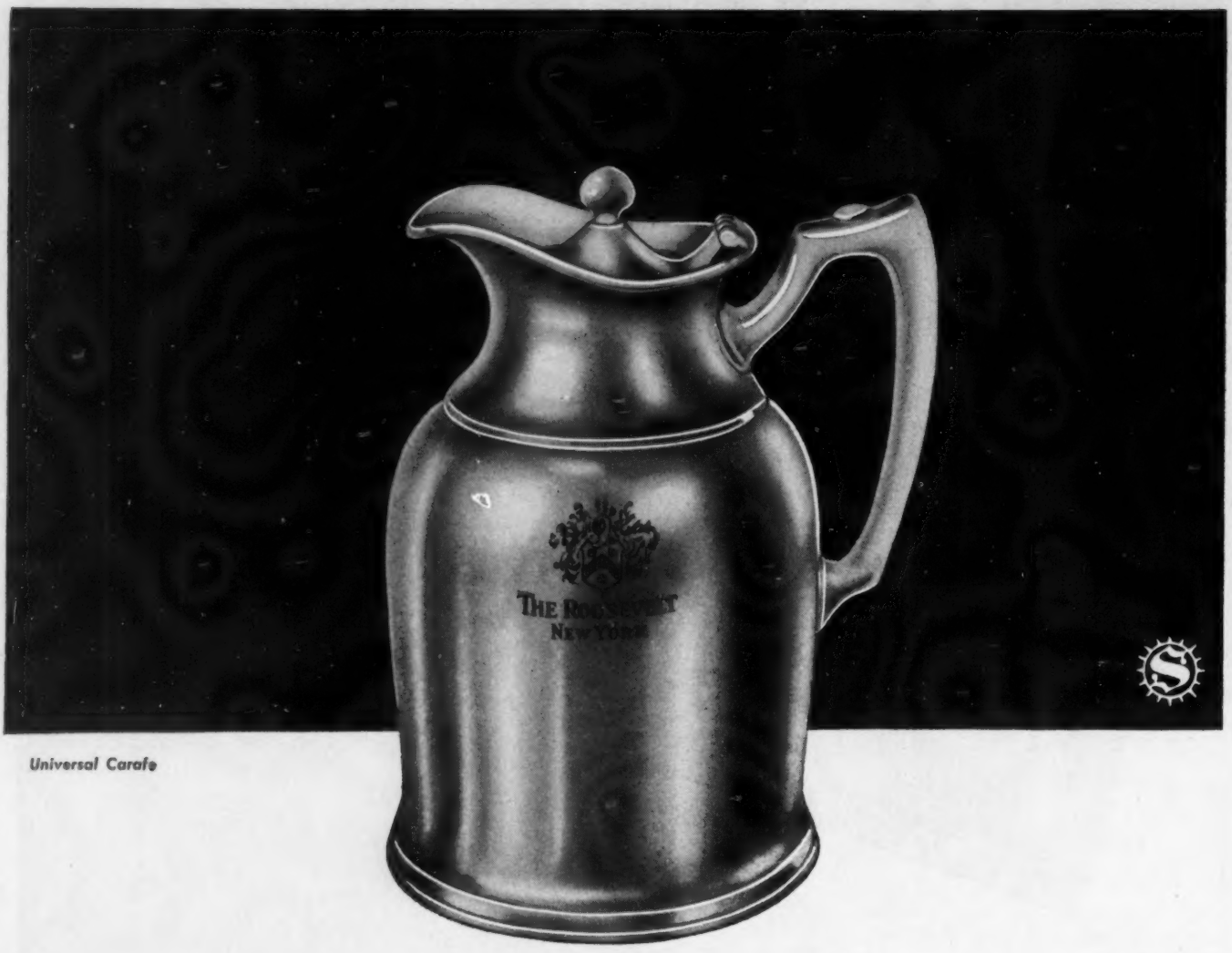

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SEYMOUR

NONFERROUS ALLOYS SINCE 1868

tile, suspended in pairs from metallic hangers.

These hangers are supported by small steel channels and I-beams formed into an arc extending across the roof of the furnace and hung from structural members supported by the furnace binding. The port roof at each end, also arched and similarly suspended, having the same inside radius as the main roof, is 11 feet 8 inches long, comprising 40 rings of 15-inch tile.

On the pit side of the roof, a series of powerful coiled springs bear against the movable skewback channels. The outside end of each spring bears against the furnace binding. This spring arrangement compensates for extension, contraction and growth of the roofs (main and port). Altogether, there are 16 of these springs which act in conjunction with the movable and rotating skewbacks. Expansion joints provided in installing the roof tile are ⅛-inch wide every fourth course in the case of transverse joints. In addition, there are eight ½-inch longitudinal joints in the main roof and six in the port roof.

A 4 foot 8 inch wide strip of roof in the middle of the furnace is constructed of a special grade of refractory tile, identified as a hard-burned, chrome-magnesite type (40 per cent magnesite). This grade is said to be characterized by unusually high resistance to deformation and to absorption of iron oxide, and has been applied only in this location.

Approximately 9400 tile were used in the main and port roofs, including about 750 special tile installed in the middle of the main roof. Construction of the roof at the north end was carried out in the same manner as at the south end, with the exception that the application of the two grades of roof tile was reversed: that is, the grade of tile used in the main roof of the south end was used for the port roof of the north end; while the grade of tile used for the port roof at the south end was used to construct the north end of the main roof.

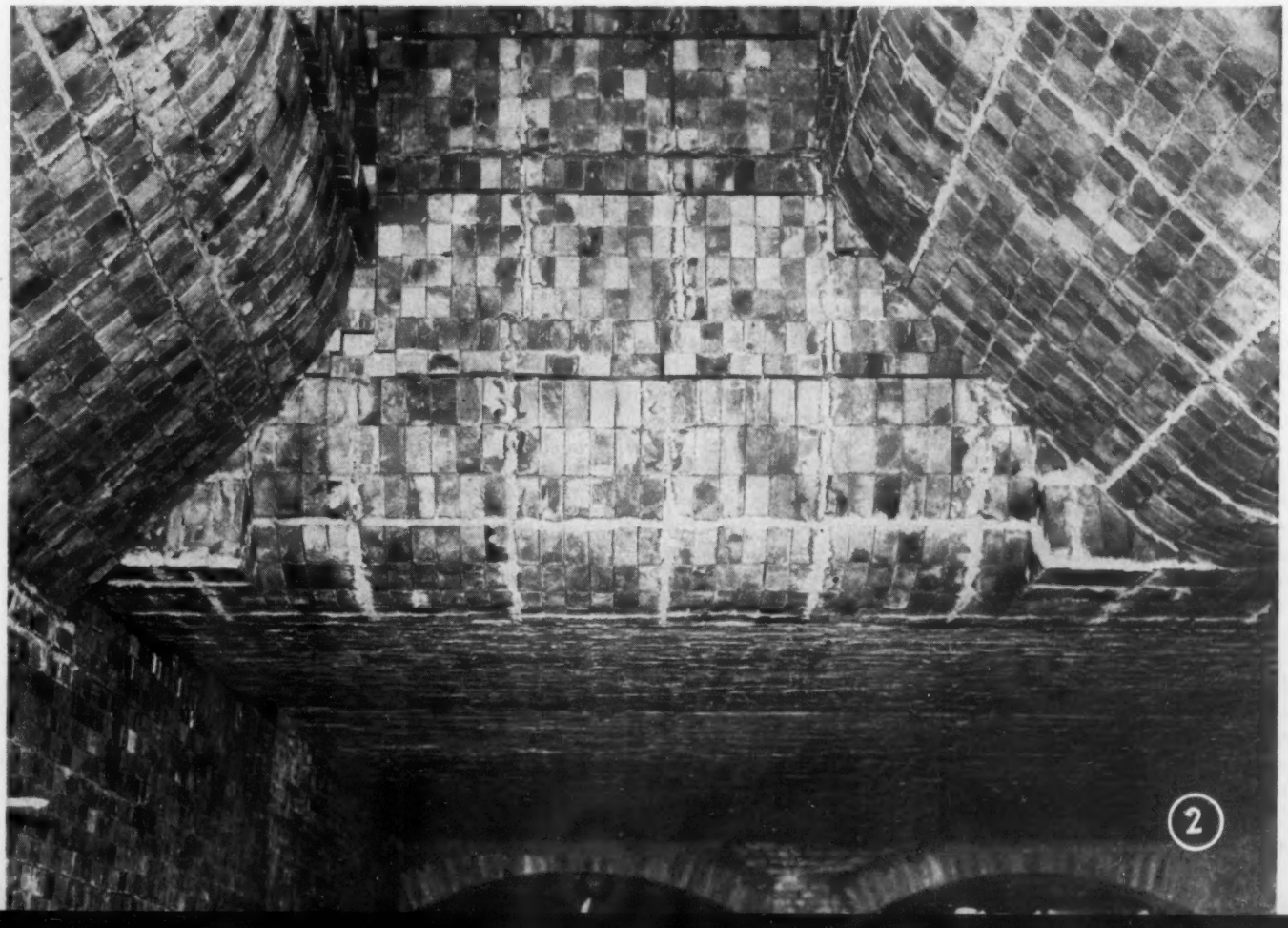
Suspension of the roofs permits replacement of individual tile or sections at any time without disturbing the remainder.

Bottom Construction: The hearth is the same as in the original furnace, except that it was carefully repaired to assure soundness. The pan is of ⅝-inch steel plate. The first or bottom course consists of 2½ inches of insulating brick laid on 1-inch of insulating concrete. The second course consists of 9 inches of first-quality firebrick; the third course consists of 9 inches of plain, chemically bonded, chrome-magnesite brick containing approximately 70 per cent magnesite; the fourth and last course consists of a layer of monolithic bottom material, basic in chemical character and 17½ inches thick at the center of the hearth.

Front and Backwalls: That portion of the brickwork from the sill or foreplate up to the bottom of the front skewback channel forms the frontwall of the furnace. In this wall are the five doors. The furnace is equipped with water-cooled, archless door frames. Masonry from the top of the back hearth castings to the channels of the movable and rotating skewback forms the backwall of the all-basic furnace. Metal-encased, chemically bonded chrome-magnesite brick containing approximately 70 per cent magnesite were used to build the frontwall and the sloping backwall. The frontwall is laid up with ¼-inch metal plates between every fourth course which are hooked onto bars welded to the sides of the front buckstays. Thickness of the frontwall is 13½ inches from a point 15 inches above the floorplate. The back wall is 18 inches thick. Starting 15 inches above foreplate level, the backwall consists of 13½ inches of the chrome-magnesite brick previously mentioned, backed with 4½ inches of first quality firebrick. The backwall is faced with a mixture of magnesite and cement.

Port Ends: Wing walls on either side of the roof knuckle form the area of greatest restriction to flow from the ports. This area of greatest restriction is known as the throat

Fig. 2—Uptake walls and upper part of slag pocket. In background are walls and roof of one of the the checker chambers



GENERAL DIMENSIONS OF FURNACE

Hearth (at foreplate level, inside brickwork):	
Length, ft.-in.	38–0
Width, ft.-in.	14–3
Depth of bath, in.	0–36
Height to spring line of main roof:	
Front, ft.-in.	5–2
Back, ft.-in.	4–4
Offset in sloping backwall, in.-ft.	0–8¾
Slope of backwall, degrees	54
Main roof:	
Span, ft.-in.	17–1½
Rise, ft.-in.	2–2
Charging floor to top of foreplate, ft.-in.	2–9
Charging doors, number	5
Throat or knuckle width:	
At base, ft.-in.	10–3
At top, ft.-in.	12–3
Center of knuckle to uptake heel, ft.-in.	5–0½
Port ends, width (outside to outside brickwork), ft.-in.	16–3
Uptakes:	
Number (each end)	2
Length, ft.-in.	5–8
Width, ft.-in.	4–10½
Combined area (each end), sq. ft.	66.6
Height of air bridgewalls above foreplate, ft.-in.	3–3
Roof knuckle to outside of endwall, ft.-in.	11–11
Slope port roof, degrees	10
Knuckle to knuckle, ft.-in.	37–8
Length furnace (outside to outside brickwork), ft.-in.	61–6

of the furnace. Wingwalls are heavy at their bases and are tapered back as they go toward the roof. Hearth sides of the wingwalls are water-cooled by 1-inch extra heavy pipes built into the brickwork, to aid them in maintaining their shapes during furnace campaigns. All wingwalls consist of alternate courses of 13½ and 18 inch (two 9-inch courses) metal-encased chrome-magnesite brick, with a 4½-inch stretcher course in front of the cooling pipes. The metal-encased wingwalls were backed with plain brick of the same refractory grade.

Tops of the air bridgewalls are water-cooled by pipes inserted one course (3 inches) below the top of the wall.

Burner Arch and Port: The burner port arch at each end of the furnace was built of chrome-magnesite brick using a 9-inch thick upper ring and a 13½-inch thick lower ring (both rings being bonded), for the sprung arch. Plain burned brick were used for the south end burner port arch in conjunction with loose steel, No. 22 gage plates, laid between courses in 13½-inch ring only. Chemically bonded, metal-encased, chrome-magnesite brick were used at the north end. The burner port, or "doghouse," resting on the burner arch at each end of the furnace was constructed of the same refractory materials as the corresponding arch, and has an overall width of 3 feet 9 inches. The walls are 13½ inches thick. The paving over the burner port is 15 inches thick, topped with 2 inches of chrome ore. From the outside of the endwall to the nose of the burner opening is 6 feet 1 inch. The burner for each end of the furnace is inserted through the endwall into the passageway through the doghouse, and is thus protected from radiation and contact with furnace gases.

Uptakes: Construction of the uptakes employed metal-encased, chemically bonded chrome-magnesite tile having approximately 70 per cent magnesite. The tile were obtained from two different sources, the uptakes at one end of the furnace being built entirely from one type with the uptakes at the other end being built entirely of the second type. This will provide comparative data on service behavior of the two types.

From the port roof down to 14 inches above the foreplate level the uptake walls (end, floor and pit sides) are 13½ inches thick. They are supported by ¼-inch steel plates laid horizontally between every fourth course and hooked onto the port buckstays. Below this level the walls are of suspended construction and are composed of 12 and 13½-inch tile, down to the top of the slag pocket. The endwall and the hearth-side wall of each uptake is undercut and overhangs the slag pocket. Groups of four 12-inch tile have their individual hangers attached to a steel plate that is hooked onto a channel on the steelwork of the binding. Between each group of four tile vertically, a 13½ x 4½ x 3-inch straight and a corrugated metal spacer are installed. The four-side uptake wall is built of 12-inch suspended tile in the same manner. Basic construction of the floor-side wall is continued around the bottom of the wall in a rounded corner or nose that extends 2 feet 9½ inches behind the face of the wall to meet the suspended roof of the fantail.

Slag Pocket: The slag pocket walls are 18 inches thick composed of 13½ inches of basic refractory and 4 inches of insulation, the basic wall being supported by ¼-inch steel plates laid horizontally between every fourth course and anchored to the binding. These walls are built of the same refractories as the uptake walls for the corresponding end. The slag pocket bulkhead is built of first quality firebrick, 18 inches thick.

First quality firebrick 13½ inches thick, were used to pave the slag pocket, which is 14 feet ¾-inch wide and 18 feet 4½ inches long from the bulkhead to the bottom of the bridgewall. The floor of the slag pocket is air-cooled.

One of the characteristics of furnaces with ends built of basic refractories is that the deposit in the slag pockets is loose and granular and so high in iron-oxide content that it may be used as feed ore. For this reason three small bulkheads were built into each main bulkhead to provide openings through which the deposit could be raked out during operation of the furnace.

Checkers: The furnace originally had two checker chambers at each end for air, each of which had a sprung arch roof. When the furnace was provided with a basic lining, the division walls between the two checker chambers were removed, the outside walls were made higher, and a flat suspended arch was installed.

Checker work is 22 feet long by 24 feet wide. It is built of 19 courses of 6 inch wide tile, and is 9 feet 6 inches deep. There is a space of 3 feet 6 inches between the tops of the checkers and the roofs. The roofs are 9 inches thick, are built of double-burned superduty firebrick, and employ refractory hangers. Each vertical checker flue is 7¾ inches square. There are 25 vertical flues in the length and 27 in the width of the chamber. Checkers are basket weave, using 18 x 6 x 2½-inch brick.

Checker brick rest on 3 x 9-inch tile, either 20 or 21 inches long. Rider arches supporting the checkers rest on 9-inch wide walls. The five rider flues beneath the checkers are each about 4 feet wide. Sidewalls of the checker chambers are 22½ inches thick, and bulkheads 18 inches thick, first quality firebrick being used to build both. Sidewalls are insulated with 4½ inches of insulating brick, and are jacketed with ¼-inch steel plate. Bulkheads are insulated with 1½ inches of insulating cement. The suspended roof of each checker is sealed with ½-inch of insulating concrete which in turn is covered with 1½ inches of insulating cement. Checker chamber floors consist of 10 inches of third quality firebrick laid on a 2-inch insulating pad.

Each checker chamber contains 5016 cubic feet of checker work, comprising 17,757 square feet of heating

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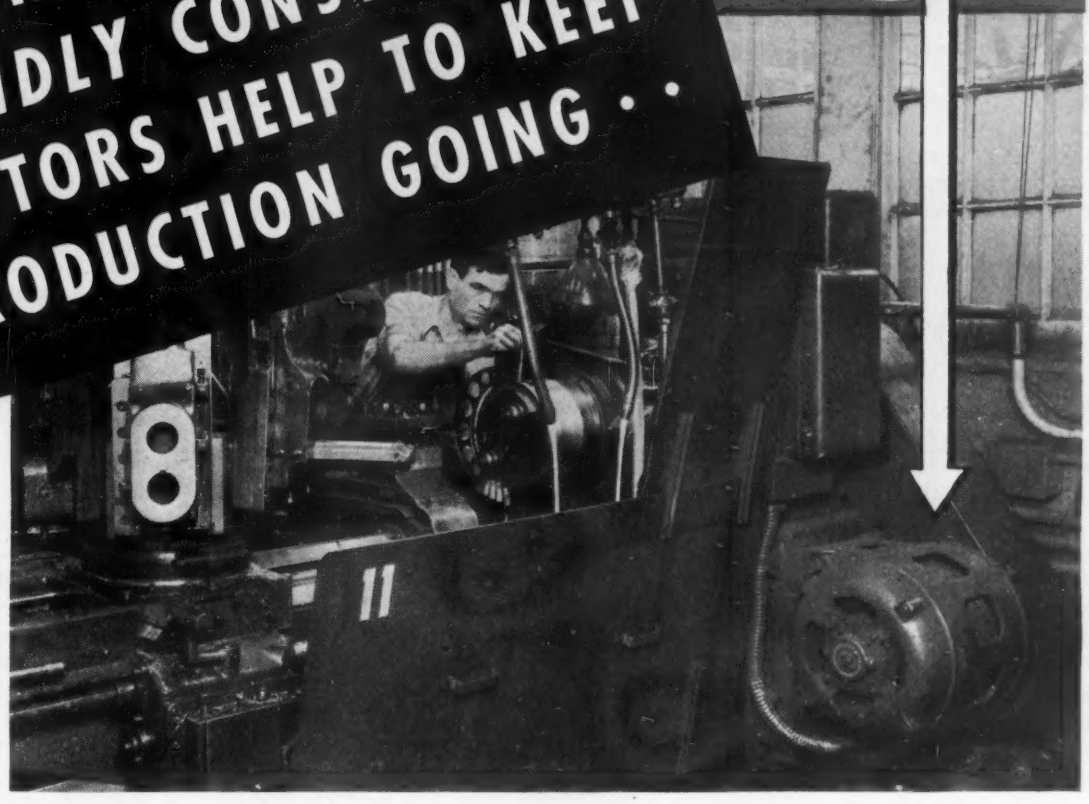

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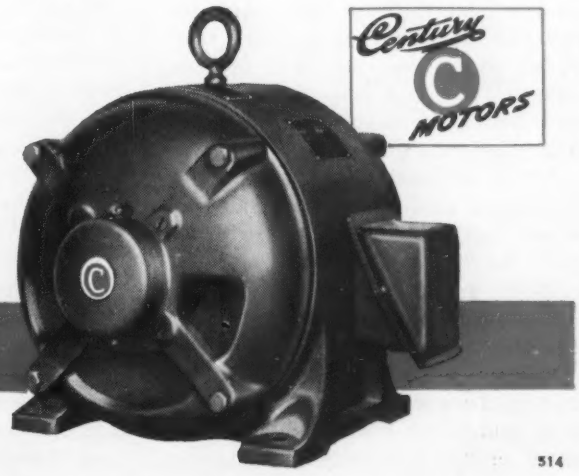

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surface. This corresponds to 3.54 square feet of heating surface per cubic foot of checker volume, and 0.57 square feet of free area per square foot of horizontal checker area. Provision is made for blowing the checkers and flues periodically with steam.

Fantails: The fantails are the passageways connecting the slag pockets with the checker chambers at each end of the furnace. The fantail walls are built of the same basic refractories as the corresponding port and slag pocket walls. The slag pocket bridgewall is air cooled, has a slope of about 45 degrees, and is constructed of a 9-inch course of plain chrome-magnesite brick above a 9-inch course of first quality firebrick laid over 2½ inches of insulating brick.

Fantail roofs consist of double-burned superduty firebrick, and are sealed with ½-inch of insulating concrete. These roofs are 12 inches thick, and of suspended construction using refractory hangers.

Flues: The flue system remains the same as for the original furnace. This consists of a double set of flues leading from each checker chamber to the stack flue. The original reversing valves, consisting of a butterfly air valve (set in stack flue) and a Dyblic gas valve, are used. During the rebuilding the butterfly air valve was replaced with one made of heat resisting alloy.

There is a waste heat boiler in the system. Waste heat to an air preheater is taken from the flue just before the waste heat boiler. The preheater, for preheating the air used to atomize the oil, is made of alloy steel tubes. An induced draft fan and air compressor are used in connection with the air preheater.

Control Devices: The original furnace had devices for measuring the quantity and pressure of fuel oil, the pressure of steam for fuel atomization, the furnace pressure, the stack draft, and the temperatures of the inside face of the main roof, of the checker chambers, and of the gases entering and leaving the waste heat boiler. Temperature of the inside face of the main roof was taken with a radiation tube located in the furnace backwall. Checker chamber temperatures were taken with thermocouples located in the bulkhead ends of the chambers, above the checkers.

When the furnace was rebuilt with a basic lining, devices were added for measuring the temperature of the fuel oil and the heated atomizing air, the flow of atomizing air and steam, the flow of oxygen, for analyzing the waste gases, for measuring steam production, and for taking additional roof and checker temperature readings. Additional roof temperature readings will be taken by a radiation tube through the frontwall, and by thermocouples located in the outside face of the roof tiles. Additional checker temperatures will be taken by a radiation tube in each chamber located in the inside checker wall, and sighted upon the roof over the checker bridgewall.

Slot Plating Range Cell

(*Concluded from Page 92*)

controlled by any means the end result is really plating range control. The direct measurement of plating range, then, is desirable. If the plating range is measured it is the best single over-all measurement that can be made. In practical applications such a measurement can be used for control of addition agents or it may be used to eliminate a chemical analysis such as the analysis for sulphate in a chromic acid bath.

A plating range test can be devised by any means that will produce a change in current density over the length of a cathode. One means of doing this is to bend the cathode toward the anode so that it is difficult for current to deposit in the vicinity of the bend. This is known as the bent cathode test. Another test that is popular is the Hull test, which makes use of an inclined cathode in such a way that the current density decreases as the distance from the anode increases.

A test cell may be made by plating through a slot. Two such cells are shown in Fig. 1a and b. In these cells the current density along the cathode drops off exponentially as the distance from the slot increases. The slot acts as an anode and may be called a slot anode. The real anode on the other side of the slot merely is a source for current and has no effect on the distribution of current over the cathode. This is a distinct advantage since the slot anode is not subject to the changes of concentration and polarization that take place at a real anode. The cells may be constructed of plastic either in an immersion-type that can be placed directly in a bath or in a box-type that is a complete cell. The immersion type is of advantage for tests on hot baths. In any small cell cooling of the bath is a problem that is overcome with the immersion type cell by testing a large portion of bath.

The cells are dimensionless. In other words a ¼-inch slot, 1 inch from a 4-inch cathode will cover the same range as a ½-inch slot 2 inches from an 8-inch cathode. Since the cells are dimensionless, and since the size of the anode compartment has no effect on the cathode, cells can be constructed to accommodate any size cathode and any volume of solution. A 4-inch cathode is convenient as a relatively small cell and yet with a cathode large enough for easy reading. A 2-inch cathode would be convenient for experimentation with expensive solutions and an 8-inch cathode would be useful for calibration of cells or for current distribution studies.

Figs. 2 and 3 show calibrations for the average conditions of acid and alkaline baths with a 4-inch cathode.

Calibrations are in terms of the average current density. This average current density is the total current divided by the exposed cathode area. From the average current density and a calibration curve, tests can be run on limiting current density or with low total currents tests can be run for covering power. If a bath has good throwing power one test will not cover the entire plating range. However, control tests are usually made with a single test. Also such control tests are usually best interpreted by means of standards on a particular bath rather than by reference to a graph. Often the standards merely consist of a few plates from a properly operating bath as a reference. Interpretation of a shift in plating range or off color deposits within the plating range are gained by experience with the bath. Some interpretation is possible from a knowledge of the chemistry of the bath but the best interpretation comes through the accumulation of typical plates. Plates may be lacquered and saved. From such plates and a log of the plating bath, more rapid control and correction become possible.

—o—

Receipt of a number of acceptances from manufacturers, distributors and users, estimated to represent a satisfactory majority, has made possible the effectiveness of the commercial standard, CS144-47, for formed metal porcelain enameled sanitary ware, according to a report from the National Bureau of Standards, Washington. It is to be considered effective for new production as of Nov. 1, 1947.

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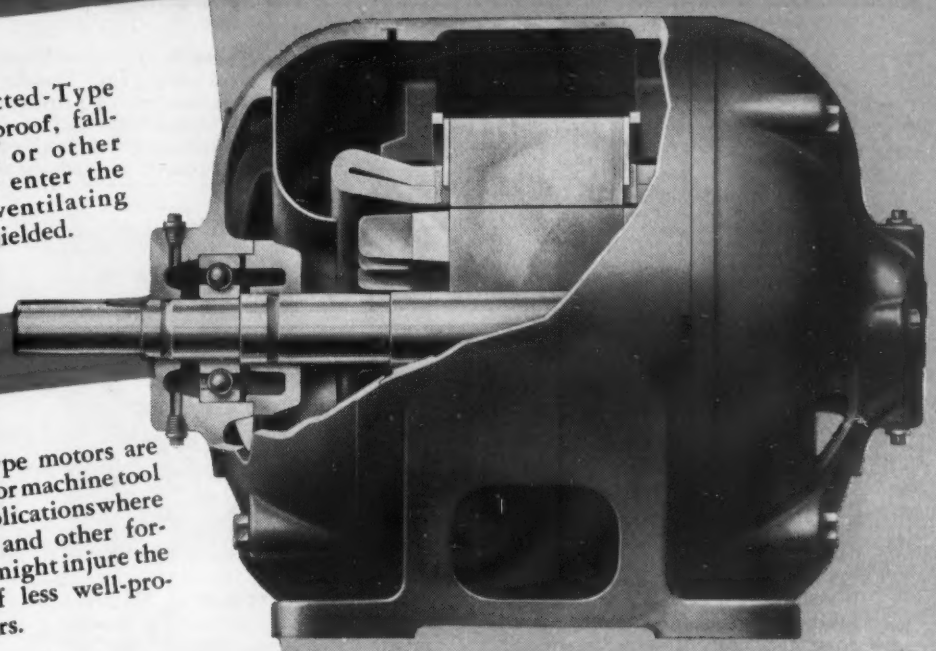

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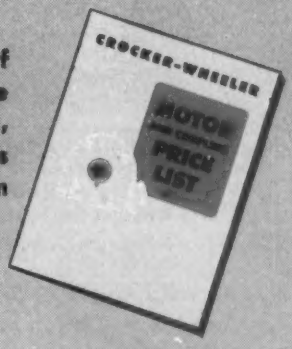

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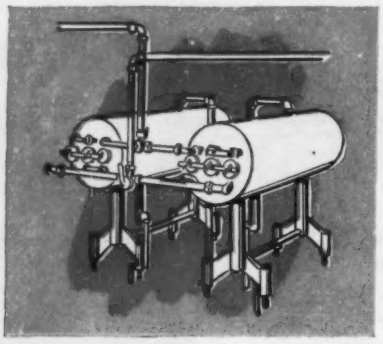

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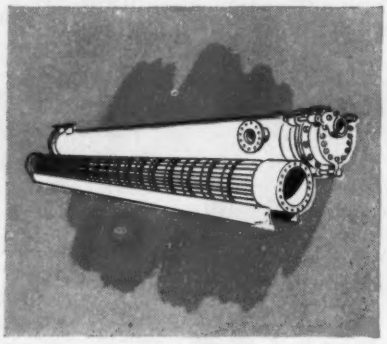

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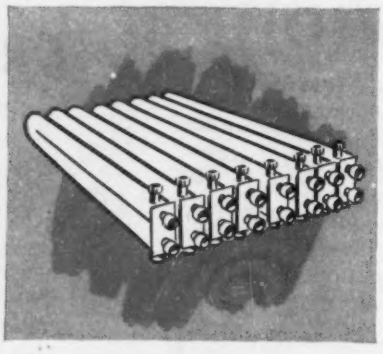

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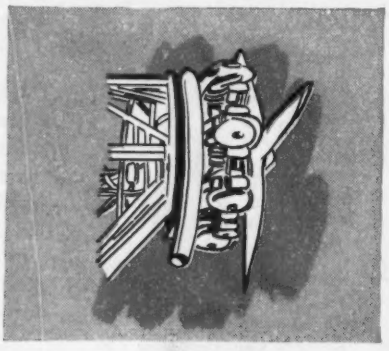

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TUBE DIAMETER	MAXIMUM WALL		MINIMUM WALL	
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3/8"	.035"	20	.025"	23
1/2"	.035"	20	.025"	23
5/8"	.049"	18	.028"	22
3/4"	.049"	18	.028"	22
7/8"	.065"	16	.028"	22
1"	.083"	14	.028"	22
1 1/8"	.083"	14	.028"	22
1 1/4"	.083"	14	.028"	22
1 3/8"	.095"	14	.028"	22
1 1/2"	.095"	13	.035"	20
1 5/8"	.095"	13	.035"	20
1 3/4"	.095"	13	.035"	20
1 7/8"	.095"	13	.035"	20
2"	.095"	13	.035"	20
2 1/4"	.095"	13	.035"	20
2 1/2"	.095"	13	.035"	20
2 3/4"	.095"	13	.035"	20
3"	.095"	13	.035"	20

*Intermediate sizes within the range indicated can also be manufactured. Please consult us for sizes not listed.

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Radiography Reveals

(*Concluded from Page* 89)

To obtain best quality from a porosity standpoint, radiography plays an important part in die casting as a means of controlling certain variable characteristics to the cold chamber process. These are controllable variables in the machine setup that tend toward a porosity-free casting. Radiograph of a proper machine setup is shown in Fig. 2, while a radiograph of an improper machine setup is illustrated by Fig. 5. Amount of porosity shown reduces structural value of the castings to such an extent that they are not suitable for their application.

Jobs of this type were given either a 100 per cent radiographic examination or a quality control check, where a certain per cent of a definite lot were radiographed. A lot usually consisted of each 8-hours work; from 3 to 10 per cent radiographed.

Light areas or spots on films usually denote some type of inclusion. This signifies some substance of a higher atomic weight than aluminum, since the rays do not penetrate this substance as readily as the aluminum alloy. Inclusions of a precipitated sludge consisting of the Al-Si-Fe-Mn constituent have been revealed on radiographs. This precipitation is a product of the reaction of the aluminum with the cast iron holding pots employed at the die casting machines. Sludge precipitates more readily if holding temperature is maintained on the low side of the liquids.

TABLE OF DIE CASTING DEFECTS

Defect	Cause	Remarks
Porosity—	Caused by trapped gases and air	Spherical dark areas, with higher pressure in cold chamber castings the defects become more elongated.
Cold Shuts—	Metal has solidified before it has reached its destination. Often caused by metal temperature being too low.	Designated by dark irregular areas.
Inclusions—	May be caused by a substance of higher or lower atomic weight than the aluminum alloy. Often caused by the Al-Si-Fe-Mn constituent.	May be shown as light and dark areas, depending on the atomic weight of the substance causing the inclusion.
Shrinks—	Uneven chilling	Dark irregular lines denoting a crack. Mostly occurs in bosses or heavy sections of the casting.

Also, inclusions of lead oxide, which is used with a lubricant in the die casting process, have been encountered on radiographs. These are usually very small spherical spots, while the Al-Si-Fe-Mn constituent will be any regular or irregular shape. This type to defect is not so detrimental to the casting from a structural standpoint as porosity; however, if the casting is machined and the tool should come in contact with the inclusion, the tool becomes dull very steadily.

Cold shuts, Fig. 4, and shrinks, Fig. 1, are not so troublesome in die casting as in some of the older methods of manufacturing castings. These two defects can be seen, usually from some outside surface characteristic. However, there are some cold shut conditions that are very difficult to reveal radiographically, especially thin wall castings. Shrinks can be determined usually by depressions on the surface of castings, particularly in the bosses.

Main aluminum alloys employed for die casting are either straight 13 per cent silicon or the 4 per cent copper 9 per cent silicon alloy. These are designated by American Society for Testing Materials as S_9 or S_5 and Sc_8 or Sc_7. Chemical composition of the S_9 and S_5 alloys is the same, except for the iron content—which is maximum 1.3 per cent for S_9 and 2 per cent for S_5. The same is true for Sc_8 and Sc_7 alloys. First alloy in each group can be used on the cold chamber machine, while the latter alloy is used on the cold chamber and gooseneck machines.

Silicon alloy is used mostly for thin wall castings that are hard to fill. Silicon addition increases the fluidity of the alloy, which is a factor for thin wall castings. Copper silicon alloy is used on castings of heavier sections, and also when a considerable amount of machine work has to be done on the casting. Copper in the alloy increases machinability and also improves the outside appearance of the finished die casting.

Harnessed Air

(*Continued from Page* 102)

are used for chipping castings in cleaning rooms of steel and iron foundries and for removing surface cracks, slag inclusions and other flaws in steel billets. The lighter types are utilized for cleaning brass and aluminum castings in foundries, beveling and caulking seams on ship shells and bottoms, and for cleaning surfaces preparatory to repainting. Another common use for the lighter chippers and caulking tools is the removal of rough scale and old paint on steel bridges and other structures. Light chippers are also found in welding plants for removing excess metal and weld splash.

Heavy riveting hammers are used principally for driving large hot steel rivets up to 1 1/2 inches in diameter in structural steel work, shipyards, railroad work, boiler shops, etc. They are also used for driving cold steel rivets of smaller size.

Jam riveters are specialized heavy riveters having a built-in air cylinder for holding the riveting hammer against the rivet. One throttle valve controls the hammer and the holding cylinder. A combination jam riveter or a hammer holder-on is merely a jam riveter having separate throttle for controling the hammer and the holder cylinder.

Sand reamers are of two types, the bench reamer, Fig. 1, for light mold and core work, and the floor type flash ramming and built-up molds. While originally sand rammers were used principally because of their immense labor saving value, their years of service have brought to the fore another outstanding fact—a decided improvement in the quality and uniformity of castings when molds are rammed by them.

Compression riveters deliver a squeezing action which is used to drive rivets by flowing the rivet metal under compression. This squeezing action may also be applied to dimpling, pressing, forming, punching, shearing or any other operation requiring a compressive force. The squeezing action is obtained from a simple air piston and cylinder coupled to a cam, toggle or wedge which multiplies the force delivered as much as ten times. Exceedingly high compressive forces are thereby obtained from compact, light weight portable units having small diameter cylinders that use very little compressed air.

Compressed air operated hoists have for many years been widely used on a great variety of operations requiring accurate and closely graduated control of the lifting and lowering speeds, as for example, serving machine tools and forging equipment and handling patterns, large cores, molds, etc., in foundries. In addition to these applications where accurate control is required, air motor hoists are very suc-

cessfully used in applications where the hoist is installed outdoors without protection from the weather or where acid fumes, explosive gases, dust, water or steam may be present in quantities that would prohibit or seriously affect the operation of other types of hoists. Among the advantages of air motor hoist is the inherent safety feature resulting from the braking action of the air motor, which prevents sudden dropping of the load even in cases of loss of air pressure or failure of brakes.

Balances are used to support portable tools in counterbalanced suspension. Their purpose is to relieve the operator of all tool weight. They also save time by holding portable tools in a convenient position to grasp when needed and reduce maintenance costs by protecting portable tools from the abuse of being dropped and kicked about on the floor, and also protect the air hose.

A balance is essentially a ball bearing-mounted cable reel having an internal clock spring. Wire rope wound on the reel extends down and is fastened to the portable tool being supported. The portable tool is free to be floated up and down against the counterbalancing action of the clock spring. Variation in the tension of the clock spring, as the reel is wound up and unwound, is compensated for by the use of a tapered sheave on the cable reel. Thus, as the operator raises and lowers the portable tool, the balancer's lifting force is always constant and exactly balances the tool.

In addition to standard pneumatic tools manufactured for a wide range of portable tool operations, especially tools are also available to perform specific operations. Usually a specialty tool is a modified standard tool with special equipment or the direct outgrowth of a standard tool.

From Compressed Air Handbook published by Compressed Air & Gas Institute, New York.

Modern Metals Protection

(*Continued from Page* 91)

Knoop indentation methods, the swinging beam or Sward rocker test, and micro scratch lists. The Pfund hardness test is perhaps the most generally useful, and is based upon the indentation produced in the film by a spherical tool, under various conditions of load. It has the advantage over the other indentation methods in that the measurement is made while the tool is in contact with the film, and is unaffected by its elasticity. It is affected by cold flow and by the support of the base metal when the film is thin. Where the superficial hardness is important in coatings which may be sanded and polished, the rocker test has been found more useful than the indentation methods.

In testing the distensibility of protective coatings, mandrel tests are recommended, as against tests of the detached films. One such mandrel test instrument, Fig. 3, developed in the Bell Telephone Laboratories, is generally satisfactory, and is specified in government and ASTM specifications.

Information on the strength of organic coatings, when examined as attached coatings, is obtained by measuring their resistance to abrasion under suitable test conditions. In the apparatus shown in Fig. 6, developed in the Bell Telephone Laboratories, a coated specimen is subjected to the cutting action of millions of small abrasive particles impelled at controlled velocity against the coated surface.

Tests for the measurement of resistance of organic coatings to impact are usually based upon falling balls or hammers. In the test used at the Bell Telephone Laboratories, a loosely pivoted, round-headed hammer strikes glancing blows on the panel surface at increasing velocity, and the speed at which it hammers through to the base is noted.

Shown in Fig. 1 is a specimen tested for impact resistance by the Bell Telephone Laboratories' Impactometer. The arrow indicates the position on the impact pattern where the finish was first shattered.

This also represents the minimum energy (in revolutions per minute of the impact tool) necessary to disrupt the film. Properties of brittleness, softness, adherence and toughness are all factors in the performance of a protective coating in this test.

No satisfactory test has been developed for the direct measurement of adherence but many of the "scratch adherence" tests have considerable practical value. Most of these methods are based on a load applied to a scraping tool which is required to bring about removal of the film.

In considering metallic protective coatings, zinc and cadmium, providing cathodic protection at pores and scratches, may be applied in thinner coats than most other coating metals, but are themselves susceptible to corrosion. On a general basis, there is little to choose between the two, but there is a distinct difference in behavior.

Cadmium will corrode more readily at lower relative humidities than zinc, in the presence of organic fumes. In an uncontaminated atmosphere, with condensation and slightly elevated temperatures, cadmium out-performs zinc. The same is true in salt fog tests. A salt fog test will consume about 0.00025-inch of zinc coating in 200 hours. A surface reaction treatment with phosphates or chromates will considerably improve the performance of both coatings in the salt fog or humidity and condensation tests. The rate of outdoor corrosion of zinc coatings has been given as 0.3 ounces per square foot per year in industrial atmospheres, 0.07 in marine, and 0.05 in rural atmospheres. Coatings 0.0002-inch thick are recommended for normal indoor use, and outdoors, upwards of 0.0025-inch.

Nickel, tin, copper and chromium must be built up to a point where porosity is diminished to a tolerable level. For mild indoor exposure, thicknesses of 0.0005-inch on steel are a practical minimum for reasonable performance whereas for outdoor exposure coatings 0.002-inch thick are required to give satisfactory results. In general, it has been found that equal thicknesses of nickel and tin have about the same protective value.

Silver, gold, and brass are primarily used for ornamental purposes and generally are dependent upon an undercoat for protection. Phosphate coatings on steel have very little protective value unless fortified with an organic material. However, both phosphate and chromate surface reaction coatings on zinc and aluminum improve the corrosion resistance.

The anodic oxide coating on aluminum is extremely corrosion resistant if properly applied and sealed. Several oxidizing processes for treatment of cuprous alloys produce good corrosion resistant coatings but the same type of treatment for steel is not particularly effective without a supplementary oiling treatment.

Ceramic coatings offer good protection but are brittle and will not stand flexing or severe impact. They are largely limited to sanitary goods. Freedom from porosity is an essential requirement.

Selection of organic coatings, as contrasted with metallic coatings, constitutes a rather complex prob-

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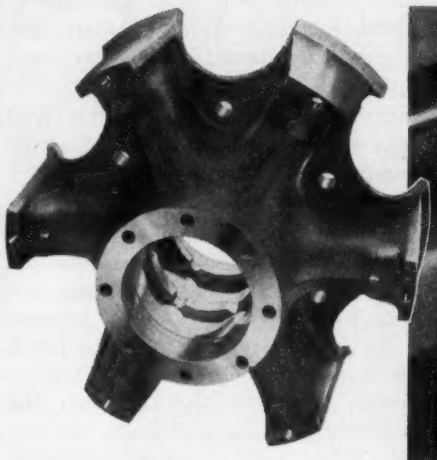

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lem due to the great range in properties and composition. The selection of organic coatings can be made scientific by considering that the ingredients that enter into the composition of the organic finish, in general, determine its properties. However, faulty processing can have a profound effect on durability and physical characteristics.

Properly formulated baking enamels have an entirely different order of protective value, as coatings, from most of the other organic coating materials. Lacquers and air drying enamels have about the same level of adherence, but many enamels will not stand the same amount of impact as good lacquers. The fast drying characteristics of lacquers are certainly factors in their favor. Pigmentation of all types of organic finishes improves their weather resistance. Generally, multiple coats of organic finishes are desirable to provide freedom from runs and sags, porosity, and to permit complete curing.

Organic Coatings for Corrosion Protection: By George W. Seagren, Mellon Institute of Industrial Research, Pittsburgh. Organic coatings are effective means of preventing the corrosion of metals primarily because they serve as protective barriers between the metal to be protected and the environment in which the corrosion will occur; the effectiveness of a coating system for this purpose is related to four characteristics: (1) The coating must be continuous; (2) it must resist the spread of corrosion from uncoated areas; (3) it must have a high degree of imperviousness; and (4) it must not itself be degraded by its environment.

In actual practice, it is very difficult to apply a coating so as to form a continuous film—with even the best coating systems available; and, furthermore, if the coating film is produced free from discontinuities initially, there is always the possibility that the coating may be accidentally injured during its service life.

This problem of producing and maintaining a continuous coating creates the necessity for selecting coatings which have suitable properties and for exercising great care in applying them. Thus, no one coating system will serve equally well for all uses. For some applications, thin films are required; for others, heavy coatings.

One of the best ways to keep to a minimum the number and size of discontinuities in a coating is to apply more than one coat. A single-coat system is seldom used except where the conditions of use are only mildly corrosive. In most cases at least two or three coats are recommended; and, for extremely corrosive conditions, five or more. Discontinuities in any one of a series of coats will not usually coincide with those in preceding coats; thus, the number of accidental discontinuities which will remain in a finished coating will be decreased considerably with each succeeding coat.

However, finished coatings frequently are not continuous initially, and discontinuities can be formed by accident to a paint film during its service life. The presence of discontinuities, however caused, is the reason why the second requisite characteristic of a good coating is important, that is the ability to resist the spread of corrosion from areas exposed by discontinuities and the enlargement of the discontinuities themselves. Coatings are not always weakened or destroyed directly by their environment. Frequently they are degraded by products of corrosion reactions near or under them. Usually such reactions are electrochemical in nature.

Discontinuities in coating films can permit the progress of still another reaction which is not a degradation of the film itself but which, nevertheless, destroys the efficiency of the coating; that is, undercutting. Undercutting is that process by which a coating is loosened from metal adjacent to exposed areas by corrosion of the metal under the coating.

This type of failure can be minimized if the metal surface is treated chemically before the coating is applied. Such chemical treatments consist of producing on the surface of the metal, by reaction with the metal itself, a suitable inert compound such as the oxide or phosphate. Such a coating is called a conversion coating and the type to be preferred depends upon the metal to be protected. For steel, the conversion coating is usually iron phosphate, although the oxides are used for some applications.

Restricting corrosion to areas of bare metal by means of organic coatings is also a function of the adhesion of the coating itself to the surface of the metal. Adhesion of a coating is basically of two kinds: Mechanical and chemical. Mechanical adhesion, which is mainly "keying" or "locking," depends on the character of the metal surface, because smooth surfaces provide poorer mechanical adhesion than do rough surfaces.

Chemical adhesion is generally thought to be a function of the coating material. Attraction is stronger between a metal surface and the strongly polar groups of molecules; so coatings which contain such molecule groups adhere more firmly to metal than do coatings in which the groups are only weakly polar. Coatings of nonpolar resins usually have very poor adhesion to metal surfaces. It is generally accepted that attraction of polar resin molecules to metal is more important in providing adhesion of coatings than is mechanical "keying" or locking.

From the practical standpoint, to take the fullest advantage of the chemical factors which provide adhesion, it is necessary that the surface to be coated be clean, because a film of grease or dirt on the metal surface to be coated can seriously diminish the attraction between the molecules of the coating and the surface of the metal or metal compound.

Permeability of a coating may be defined as the rate at which a gas or liquid will diffuse through the organic film to the surface of the metal beneath. There are no organic coatings which can prevent completely the diffusion or permeation of moisture, even though there are no gross discontinuities in the applied film; but all coatings are not equally permeable. The rates of permeation through coatings vary over a wide range; from less than one to more than 300 milligrams of moisture in 24 hours through a one-square inch area of film one mil thick.

Complete exclusion of moisture cannot be attained, but the effect of moisture can be minimized by one of the following methods: First, permeability can be reduced by special pigments. Pigments, such as aluminum, which have a flaky structure, reduce permeability by lengthening the path which moisture must travel through the film from the outside surface to the underlying metal. Second, special pigments, by their oxidizing action, render the permeating substance less corrosive. Red lead and zinc yellow are familiar examples of oxidizing pigments; zinc oxide and basic lead chromate are effective probably because of their alkalinity.

Third, metal pretreatments, such as phosphating, reduce the corrosivity of the metal surface by producing on the surface of the metal, a compound of the metal which is less reactive than the metal itself. Fourth, pigments may retard corro-

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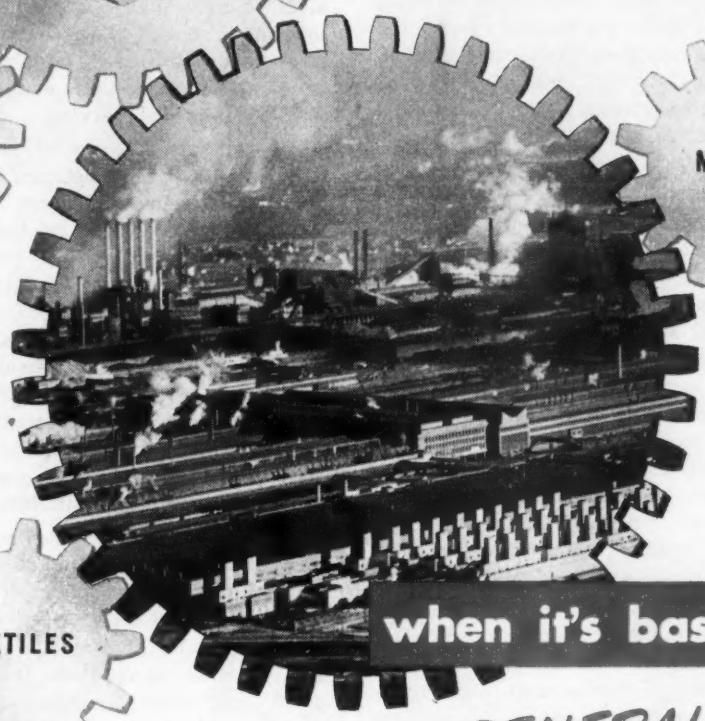

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sion by being anodic with respect to the metal protected. Tests have indicated that high loadings of zinc dust or aluminum powder in organic vehicles produce what is, in effect, cathodic protection of underlying steel surfaces.

Resistance to degradation by environment is contributed chiefly by the constituent film-forming or resinous substance, which may be selected from a very large and rapidly growing group of materials. In research, laboratory data are accepted as valid bases for evaluating coatings; but it also is valuable to learn what kind of service organic films give in practical use.

Many organic coatings have failed to give satisfactory protection against corrosion simply because all the factors which accelerate corrosion or which make it possible to coat a surface efficiently are not understood. Dissimilar metals in contact with each other, and structures submerged in water constitute an electrical unit which will accelerate the corrosion of one of the metals unless both metals are effectively coated. If only the corroding metal is coated, and if the coating is not perfect, galvanic reaction is localized and intensified at breaks in the coating film, and deep pitting or even perforation will occur.

Another obstacle to good coating applications is complex structural designs—for it is practically impossible to coat well a surface that has narrow crevices and sharp edges, if only because coatings flow away from edges, and because solvents which must escape from paint films in crevices, inevitably leave discontinuities in the cured film. Metal equipment and machinery which must be protected by coatings should be designed to have as smooth a profile as possible, with a minimum of complicating surface details. It is not necessary that a design engineer be familiar with all types of organic coatings, but it is highly desirable that he have an understanding of the fundamental corrosion processes, and of the mechanics of corrosion prevention by means of organic coatings. Equipped with such information, the engineer will consider corrosion prevention as another problem in design. Too frequently, corrosion protection is only a necessary after-thought. Many of the difficulties with which organic coating technologists are confronted might have been avoided on the drawing table.

Synthetic Rubber Derivatives as Corrosion Resistant Coatings: By J. B. Martin, Hercules Powder Co., Wilmington, Del. Since rubber has long been used in providing corrosion resistant linings for various vessels, it was only natural that its possible use in paints should be studied. Although rubber itself is not soluble in the usual paint solvents and oils, chlorinated rubber is soluble, and a solution in toluol, for example, gives a clear, transparent, acid and alkali resistant film. As a result of German connections, the Hercules Powder Co. received, in 1935, a sample of chlorinated rubber being used as a paint base. This material provided such a resistant paint for use in a nitrating plant that in 1936 Hercules started manufacture of chlorinated rubber. With allocation of rubber in 1942, chlorinated rubber based paints disappeared from the market but are now coming back.

An outstanding property of a chlorinated rubber film is near-immunity to almost all agents which commonly destroy paint films by chemical action. These include such powerful chemical destroyers as strong acids, alkalis, bleaches and gasoline. Also important, in many cases, are the resistant surfaces chlorinated rubber gives the formulator as protection against simple dampness and vapors, and fumes of various kinds. Films of chlorinated rubber possess a high degree of water impermeability and a very low degree of water absorption.

Chlorinated rubber formulated coatings, in common with other coating materials, have limitations. Surfaces exposed continuously to high temperatures must be avoided. Chlorinated rubber base paints are not suitable for continuous exposure to liquids above 140°F or to dry heat above 160°F due to the thermoplastic character of the material.

Chlorinated rubber is particularly adapted for the manufacture of industrial maintenance paints and quick drying enamels, which when properly formulated, are finding increasing use under many different kinds of corrosive conditions. Alkyd finishing materials formulated with 20 per cent chlorinated rubber are also being used.

Some applications of chlorinated rubber base paints are their use in ice cream truck finishes to resist salt corrosion; in undercarriages of cars and on license plates to combat road salt; in washing machines, commercial laundries, and bottling machines to resist soap alkali; on structural steel and equipment in acid plants and oil refineries to resist acid fumes; in bakeries and breweries to resist fungus and mold growth; and in many other varied uses. The field of chlorinated rubber based paints for protection against corrosion is at present, only in its infancy.

Protective Coatings for High Temperature Applications: By W. N. Harrison, National Bureau of Standards, Washington. A new type of ceramic coating for the protection of mild steels in high temperature service was developed during the war at the National Bureau of Standards and was used by the Army and Navy on the exhaust systems of certain aircraft and other vehicles. Laboratory and service tests have shown these new coatings to be superior to conventional porcelain enamels for high-temperature service.

Outstanding features of the coatings are (1) high resistance to chipping under repeated severe thermal shock, (2) protection of the metal against oxidation during prolonged exposure in air at temperatures up to about 1250°F, (3) freedom from cracking and blistering produced in conventional porcelain enamels under comparable conditions of high temperatures and severe thermal gradients, and (4) a mat surface that does not show highlights and therefore decreases the visibility.

To prepare these coatings, a mixture of a special grade of calcined aluminum oxide, and a conventional type of ground-coat frit is ground with water to appropriate fineness, and is then applied to the metal, dried, and fired according to well-known methods used in the trade. In experimental work at the National Bureau of Standards to determine the best material for addition to conventional frit materials, to accomplish the desired purpose, various refractory materials, singly and in combination, were added as mill additions in varying amounts to conventional ground coat enamel frits. The admixtures that were tried included zirconium oxide, titanium dioxide, ferric oxide, aluminum oxide, chromic oxide, silicon dioxide, silicon carbide, feldspar, mullite, and chrome ore. Batch compositions of two base frits were used.

Coatings, as prepared from the two frits with the various refractory admixtures, were applied to low carbon steel specimens and fired at temperatures up to 1650°F. They were then examined for surface textures and adherence. The ones showing promise were heated for periods of several hours at a temperature of 1650° F in order to obtain, rapidly, an indication of their effectiveness. In these early heating tests, chipping, "burn-off", flow of the coating, and

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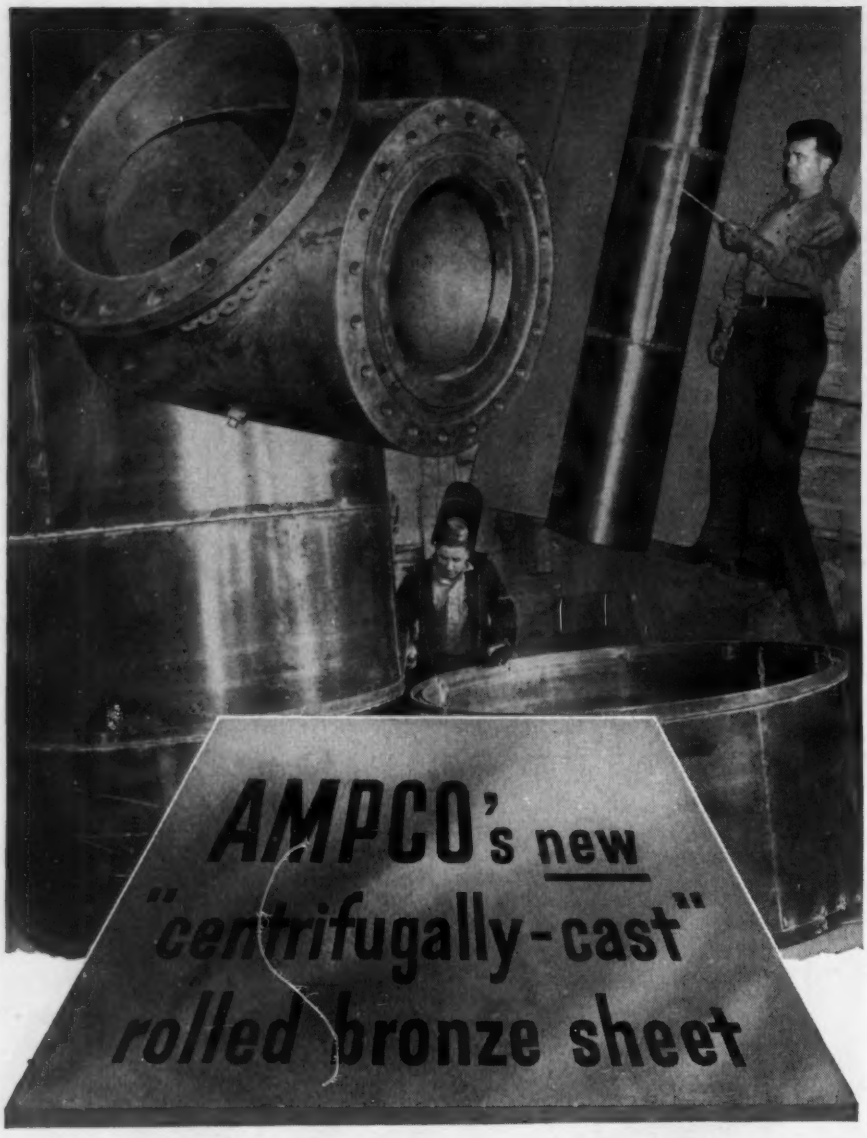

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blistering were common defects. Of the various coatings included, those containing alumina showed the best possibilities.

Early in the study of alumina admixtures it was discovered that the type of alumina grain had a controlling influence on the characteristics of the coating. For example, it was found that fused alumina, or alumina calcined at high temperature, gave dense, glossy coatings when so fired as to give satisfactory adherence. These glossy coatings all showed reboil when heated to appropriate temperatures.

Other grades of alumina calcined at lower temperatures and available at reasonable cost, gave mat coatings that were free of reboil when substituted in the same formula in like amount.

A-1 alumina obtained from the Aluminum Ore Co., East St. Louis, Ill., was of this type and was used as the refractory admixture in the coatings selected. Three of the coatings prepared with admixtures of A-1 alumina as shown in above table, were found to be outstanding from the standpoint of appearance, ease of application, and adherence to the metal. Shown in Fig. 4 is an exhaust collector coated with NBS ceramic coating A-19. No visible defects occurred during service testing. Fig. 5 shows an exhaust collector and muffler for small aircraft engine, coated with conventional type of porcelain enamel. This finish gave substantial protection but developed cracks and blisters which exposed some of the steel.

MILL BATCHES USED IN THE PREPARATION OF NBS CERAMIC COATINGS A-19, A-20, AND A-55m

Ingredient	Parts by Weight A-19	A-20	A-55m
Frit 1	50.0	....	....
Frit 11	50.0	100.0	100.0
Calcined alumina	25.0	20.0	15.0
Enameler's clay	10.0	6.0	15.0
Black cobalt oxide	1.0	0.25	0.50
Citric acid crystals	0.05	0.05	0.03
Water	50.0	50.0	50.0

In addition to the use of these new ceramic coatings for the protection of low-carbon steel in various military exhaust systems, there are a number of other possible applications where the new coatings, or modifications thereof, might be beneficial in prolonging the life of steel parts that are subjected to relatively severe temperature conditons. Such potential applications would include the coating of domestic stove parts, such as grates or burners, and industrial furnace parts, such as muffles, damp-

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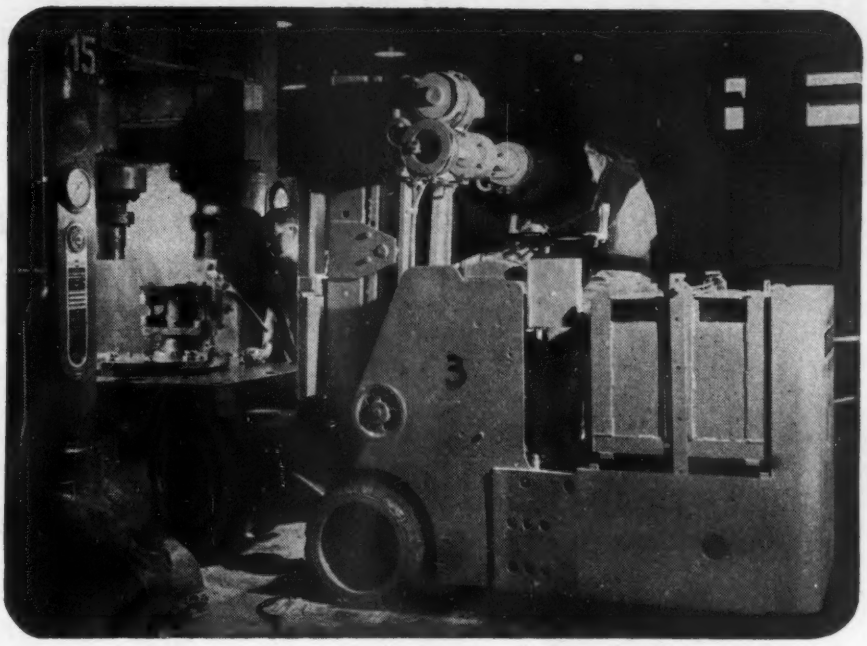

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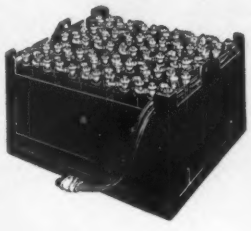

In replacing a loaded skid box with an empty beside a machine, an industrial truck will make an average of approximately 14 moves forward, backward, up and down. A battery industrial truck has a natural advantage in this kind of stop-and-go service because it gets the necessary surges of power instantly from its battery, yet consumes no power during the stops. Thus it is not only economical of power, but the electricity used for charging its batteries is low-cost power.

Its electric-motor drive operates quietly, without vibration, and thus with well-nigh negligible repair requirements. With batteries exchanged two or three times per 24 hour day, it is continuously supplied with power and, since one battery is charged while the other works, the truck need not stop work for servicing of its power unit.

For 24 hour-a-day material-handling work, therefore, a battery industrial truck is an inherently dependable and economical machine, especially when powered by EDISON Nickel-Iron-Alkaline batteries. With steel cell construction, a solution that is a natural preservative of steel, and a foolproof electrochemical principle of operation, they are the longest-lived, most durable, and most trouble-free batteries. *Edison Storage Battery Division of Thomas A. Edison, Inc., West Orange, New Jersey.* In Canada: *International Equipment Company Limited, Montreal and Toronto.*

EDISON

Nickel • Iron • Alkaline

STORAGE BATTERIES

In Industrial Trucks, EDISON Nickel-Iron-Alkaline Batteries Give You These Important Advantages.

1. They are **durable mechanically;** grids, containers and other structural parts of the cells are of steel; the alkaline electrolyte is a preservative of steel. 2. They can be **charged rapidly;** gassing cannot dislodge the active materials. 3. They can **stand idle indefinitely** without injury. Merely discharge, shortcircuit, and store in a clean, dry place. 4. They are **simple and easy to maintain.** 5. They **withstand temperature extremes;** are free from freezing hazard; are easily ventilated for rapid cooling. 6. They are **foolproof electrically;** are not injured by short circuiting, reverse charging or similar accidents.

STAINLESS STEEL FORGINGS

Discs, rings, shafts . . . forged, heat-treated and machined to size by Midvale. Allowance is made for finish. Available types are 302, 303, 304, 316, 347, 410, 416, 430 and 440. Or they will be made to your own specifications. Midvale's quality control system assures you of the final result. Your inquiries are invited.

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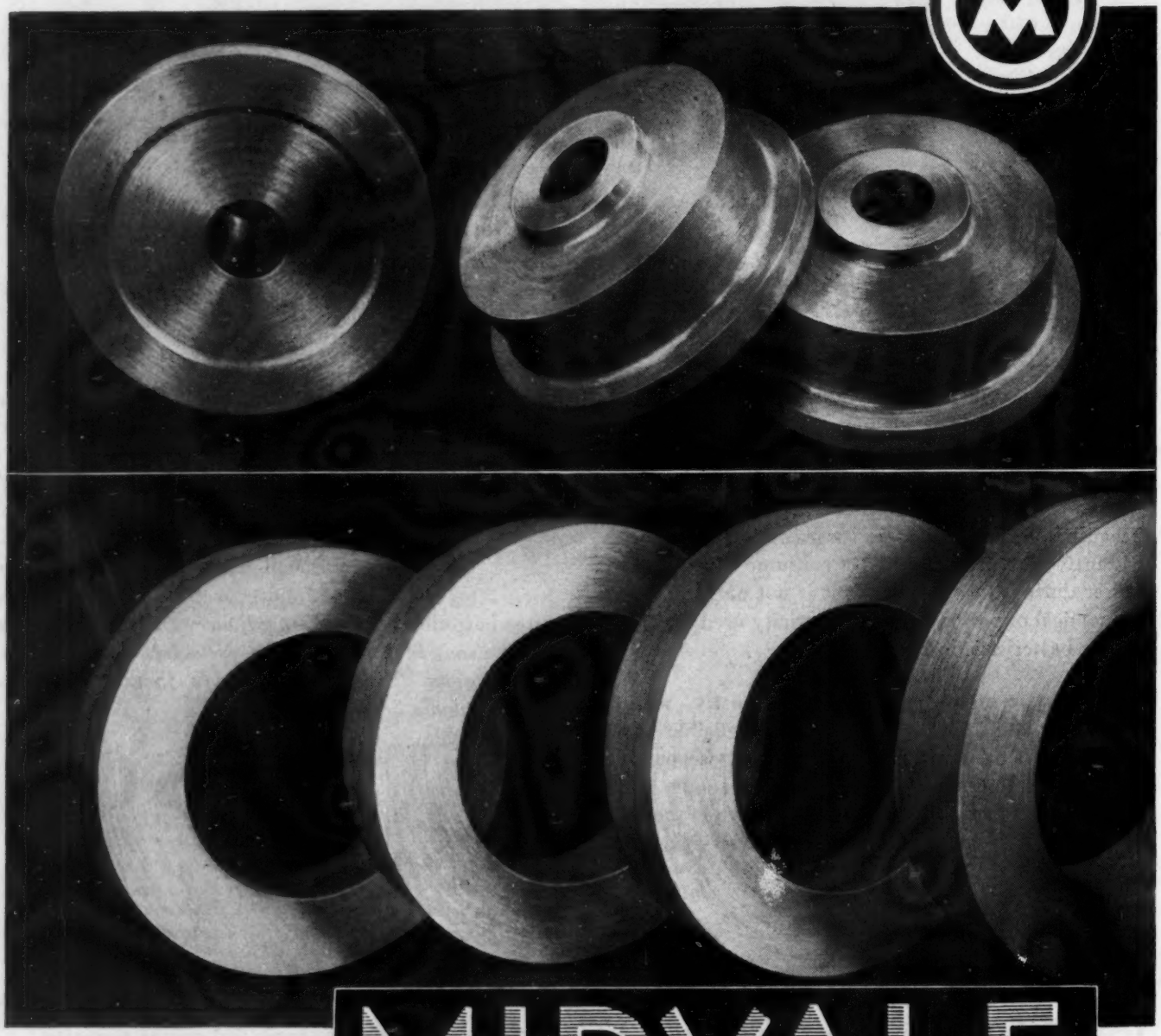


STAINLESS AND TOOL STEEL BARS

•

CORROSION AND HEAT RESISTING CASTINGS

•

FORGINGS AND RINGS

MIDVALE

Custom Steel Makers to Industry

ers, or burners, as well as parts for heat interchangers.

Among industrial uses for which ceramic coatings of this type have been found successful, is the coating of baffle plates for use in continuous furnaces. Baffle plates are spaced periodically along the conveyor chain to prevent excess convection from one part of the furnace to another and an excessive loss of heat through the ends of the furnace. Another use is to coat the inner cylinders of the burner jackets used on kerosene stoves. These jackets often become red hot during operation and the functioning of the burner frequently deteriorates as a result of corrosion of these parts. Other potential uses are for annealing boxes and as a coating for mufflers and tail pipes for buses, trucks, and automobiles.

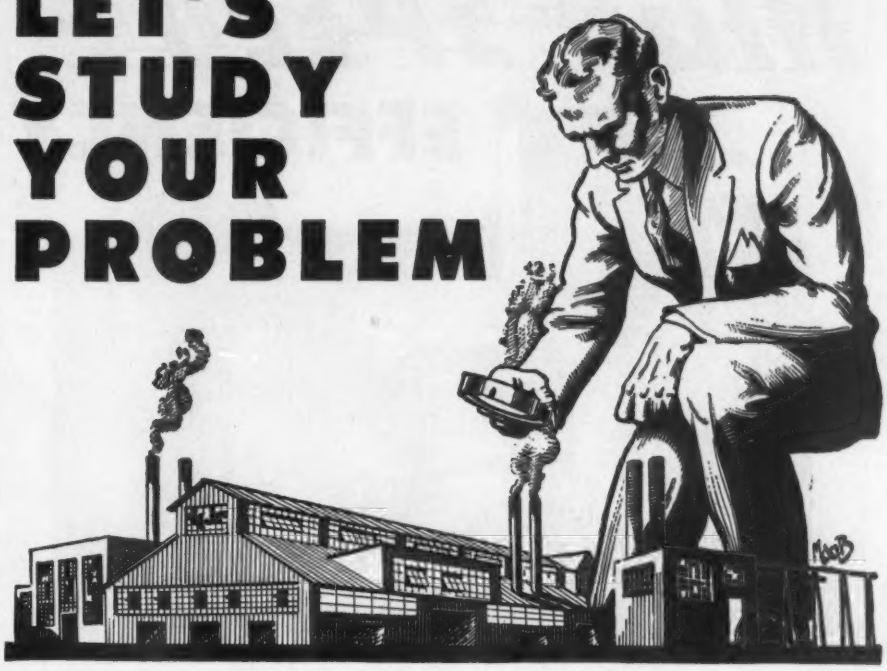
Corrosion Resistant Chemical Equipment of Stainless Steel: By W. R. Meyer and H. L. Maxwell, E. I. DuPont de Nemours and Co. Inc., Wilmington, Del. Failures of stainless steel equipment used in the chemical industry are caused by four types of corrosion, classified as (1) intergranular; (2) pitting; (3) general; and, (4) stress-cracking.

Intergranular corrosion is caused by selective attack of grain boundary material or of the portion of the grains immediately adjacent to the grain boundary material. It occurs when the unstabilized alloys (AISI types 302, 304, and 309, for example) are so treated that carbides precipitate in the grain boundaries. Susceptibility to intergranular atack is determined by the chemistry of the alloy, the treatment accorded the material prior to, and during fabrication, and also the corrodant to which the finished product is exposed.

Fortunately, the 18-8 type of alloy can be rendered relatively immune to intergranular attack by the addition of columbium (AISI type 347) or titanium (AISI type 321). Columbium is generally used as the stabilizing agent for castings. The stabilized alloys of the 18-8 type are generally welded with filler rod which deposits metal corresponding in composition to AISI type 347. For most applications, welded equipment made with stabilized material is not susceptible to intergranular corrosion.

Pitting corrosion, or pronounced tendencies to pit in certain environments, is exhibited by most of the austenitic stainless steels. The molybdenum-modified types show better resistance to pitting than the molybdenum-free types and are useful in some applications where the

LET'S STUDY YOUR PROBLEM



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Is it Materials Handling?

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Engineers and Architects
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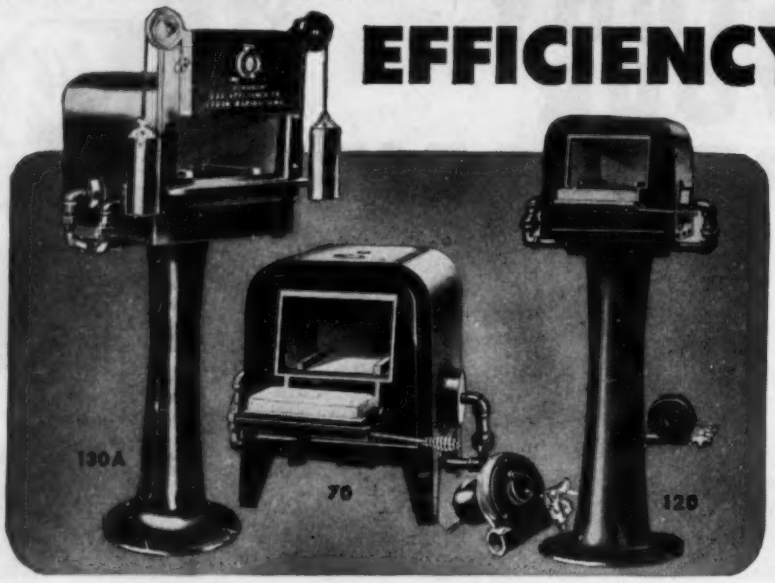

THAT *CUTS* PRODUCTION COSTS

Quick Acting JOHNSON FURNACES

Reduce toolroom bottlenecks and eliminate unnecessary lost time waiting for tools and dies. Heat treat high speed steels, harden high carbon steels, braze carbide tipped tools in your own plant. There's no waiting for *Quick Acting* JOHNSON Hi-Speed Heat Treating Furnaces. They are ready for action to produce high uniform temperatures quickly and at remarkably low fuel cost. Wide temperature range can easily be regulated with accuracy to handle ANY steels or for hardening small metal parts. Install *Quick Acting* JOHNSON Furnaces on your firing line and turn the heat on production. There's a size for every toolroom and shop. Write for descriptive literature.

No. 130A Hi-Speed
For steels requiring 1400 to 2300°F.
Firebox 7¼ x 13 x 16½.
Four burners.
$295.00

No. 70 Hi-Speed Bench Furnace
2250°F. in 30 Minutes
Treats all steels.
Firebox 5 x 7¼ x 9.
Two burners.
$105.50

No. 120 Hi-Speed
1500°F. in 5 Minutes.
2300°F. in 30 Minutes
Firebox 5 x 7¼ x 13½.
Two burners.
$145.50

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latter cannot be used. Aqueous solutions of inorganic chlorides are aggressive pitting agents.

It is recognized that stainless steels will pit readily in certain waters. The susceptibility to pitting by water can be attributed in many cases to oxygen impoverishment. It is necessary to pay particular attention to the water when specifying stainless steel for water handling equipment. This is particularly true if a supply source is used which fluctuates significantly in composition between winter and summer, and between drought and wet periods. It is, of course, desirable to use materials which are resistant to the worst conditions rather than the average conditions.

General corrosion, or general attack, results from the corroding action of some chemical agents on stainless alloys. The applications where corrosion of this type is most frequently encountered involve dilute solutions of sulphuric acid, or mixtures of sulphuric-nitric, and sulpheric- organic acids. If stainless alloys are specified, types 316 and 317 are generally used. Type 309 and 309-Cb are used in a few cases. Types 304 and 347 are employed infrequently. These types exhibit poor resistance to dilute sulphuric acid. It has been observed that the coupling of lead and stainless steel in sulphuric acid solutions sometimes causes active corrosion of the stainless.

Stress corrosion cracking may result when austenitic stainless steels are exposed to certain reagents. Generally, exposure to chloride solutions is involved. It is reported that investigators abroad have found that stress-corrosion cracking of stainless cannot be produced in the absence of oxygen.

Several of the ferritic stainless steels find rather wide use in chemical plants. Type 430, with a restriction in chromium content of 15-16 per cent, is used in nitric acid manufacture and transportation. Type 329, with a molybdenum content of approximately 1.5 per cent, can be hardened to approximately 400 brinell, and is often used in applications where abrasion or galling resistance, along with stainless properties, are required.

Corrosion Resistance of Nickel Base Alloys and Applications in Processing Equipment by R. B. Long, Haynes Stellite Co., Kokomo, Ind. The Hastelloy alloys are nickel-base, corrosion-resistant alloys developed for handling the most severe corrosion problems. These alloys are made in four grades or types, distinguished

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PRODUCTION
of
GREY IRON CASTINGS

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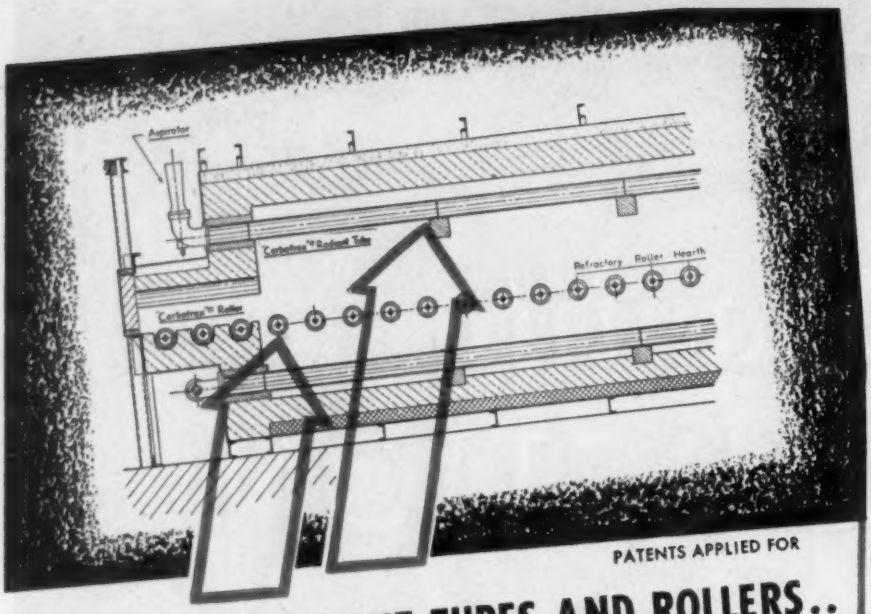

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NEW TYPE RADIANT TUBES AND ROLLERS.. REDUCE HEAT TREATING COSTS PROVIDE CONTROLLED ATMOSPHERES UP TO 2500° F. WITH GAS HEAT

"CARBOFRAX"* Radiant Heating Tubes and Rollers are not only reducing heat treating costs in conventional furnace operations — but also achieving temperatures up to 2500° F. in special and protective atmospheres with radiant gas heat.

Laboratory tests and actual plant operation prove these outstanding advantages of "CARBOFRAX"* Tubes and Rollers in GASMACO Industrial Furnaces:

- Lower initial cost—longer life
- Operation up to 2500° F.
- High heat transfer and fuel efficiency
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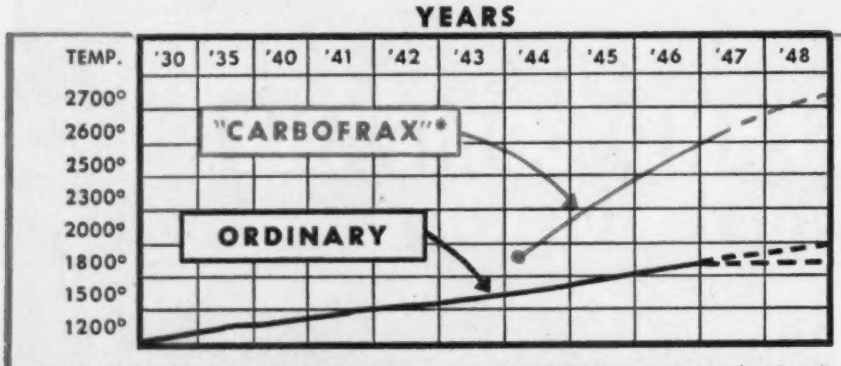
- Freedom from "crankshafting"
- Gas-tight operation
- Low heat loss through insulated water cooling

We shall be glad to send you complete information or arrange for an engineer to call.



Development of high operating temperatures with "CARBOFRAX"* as compared with ordinary tubes and rollers. Because these high temperatures are economically practical, new fields are being opened in heat treating with gas fired roller hearth radiant tube furnaces.

*"CARBOFRAX" is a registered trade-mark indicating manufacture by the Carborundum Company.

WRITE FOR FOLDER A-100

THE GAS MACHINERY Company

Designers and Fabricators of Industrial Heating and Handling Equipment • Manufactured Gas Plants and Special Equipment

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by the designations A, B, C, or D. The development of uses for Hastelloys alloys does not lie in the displacement of other types of corrosion resistant materials. Its future lies in the applications where no other material will serve the purpose safely and economically.

Alloys A and B were developed primarily for resistance to hydrochloric acid and to other reducing acids and reducing corrosive salts. Hastelloy alloy A is a nickel-base 20 per cent molybdenum and 20 per cent iron. It is resistant to hydrochloric acid and reducing acid conditions up to temperatures of 170° F. Alloy B is a modified form of alloy A. It contains 30 per cent molybdenum and 5 per cent iron and is resistant to the same conditions at temperatures up to the boiling point, and in some cases, at temperatures above the normal boiling point, and at higher pressures.

Alloy D is a nickel silicide containing approximately 85 per cent nickel, 10 per cent silicon, 3 per cent copper, and 1 per cent aluminum. The alloy has excellent resistance to sulphuric acid and is chiefly used for this purpose, although it also has good resistance to phosphoric acid and many acid salts.

Alloy C is a nickel-base alloy containing 17 per cent molybdenum, 15 per cent chromium 5 per cent tungsten and 5 per cent iron. Because of its all-around corrosion resistance this material has been successfully used by many chemical concerns operating batch-type processes.

Some Notes on Corrosion Behavior of High Nickel Alloys and Stainless Steels: by H. O. Teeple, International Nickel Co., New York. Stainless steels can solve most of the problems in the chemical processing industries if they are properly selected. There are many factors that may enter into the corrosion resistance and service life that can be had from the stainless-type alloys. Some of these factors are temperature, presence of oxidizing agents, air velocity or agitator, selection of proper inhibitors, development of concentration cells and stress relief heat treatment.

Temperature variations within the range 30 to 90° C have been found to have little effect on the corrosion resistance of stainless steel in nitric acid, as is illustrated in the following tabulation showing inches penetration based on the use of a 5 per cent nitric acid solution:

30° C	0.000004
60° C	0.000004
90° C	0.000006

FERRO-ALLOY *Symbols* OF METALLURGICAL PROGRESS

FERRO-SILICON
50% - 75% - 85% - 95%

SPECIAL BLOCKING
50% FERRO-SILICON

FERRO-CHROMIUM

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"Never send a boy to do a man's work," goes an old saying, and this is especially true in the case of cranes. To lift heavy loads of hot metals, slabs, ingots, raw materials, finished products . . . to maintain smooth-flowing production schedules, your plant or project requires rugged, dependable, *efficient* cranes—the type built by Alliance.

For fifty-odd years, engineers and production men have been bringing their material handling problems to Alliance . . . World's Largest Builder of the World's Largest Cranes.

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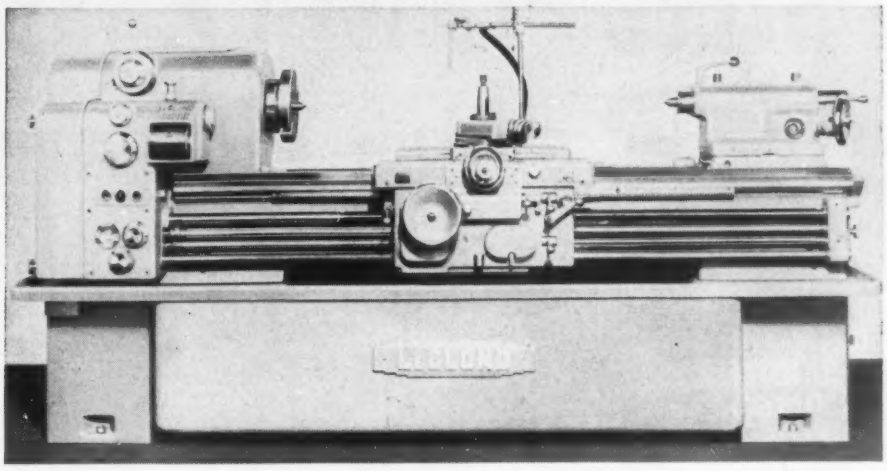
New Products and Equipment

Additional information on the new products and equipment described on this and succeeding pages may be obtained, without obligation, by checking appropriate numbers on the cards following page 156

1. Tool Room Lathe

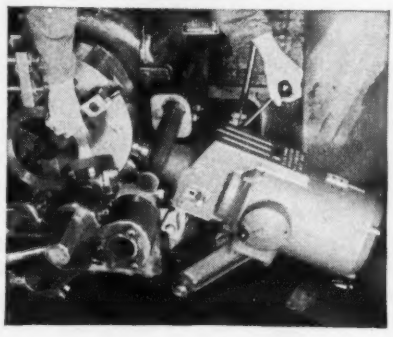
Wide range of spindle speeds and increased ease of operation are features of the model RT 16-inch tool room lathe announced by R. K. LeBlond Machine Tool Co., Cincinnati 8, O. More than 100 speeds may be obtained in each of three ranges without stopping the spindle. Gear-belt drive headstock gives the three ranges of spindle speeds.

Lathe has a universal power rapid traverse which moves carriage, cross slide and tailstock. A quick change gear box has a revolving index plate on the feed box which contains instructions for obtaining five different types of 60 threads and leads each. Variable speed drive consists of four elements: Speed control units; 7 1/2-horsepower adjustable speed main drive motor; speed adjuster unit; and motor generator. Quick stops are effected through dynamic braking.



2. Automatic Wrench

Consisting of a variable torque motor operating a retractable spindle, a new automatic wrench, announced by Fen Machine Co., 1350 Babbitt Rd., Euclid, O., is offered in two models with maximum torque capacity of 4000 and 6000 inch-pounds. A selec-

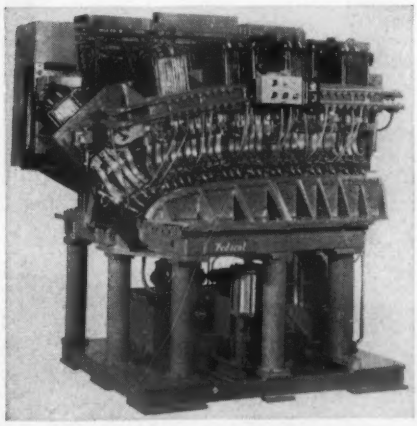


tor wheel on side of housing enables selection and holding of any desired torque from 0 to the maximum for the unit. Downward lever movement engages wrench spindle in the chuck pinion. Left and right movements of same lever operate a momentary switch which energizes motor for gripping or releasing work.

Overrun is prevented by a brake which applies to rotation in either direction. Wrench is adaptable to many types and sizes of machines. Where conventional mounting cannot be used, a right angle drive head is provided. Model 4M (4000 inch-pound capacity) is recommended for use with chucks up to and including 12 inches in diameter. Model 6M (6000 inch-pounds capacity) is for use with chucks 15 to 30 inches in diameter. Both have motors of 220 or 440 volts, 60 cycle, 3 phase current.

3. Spot Welder

Development of a multipoint spot welder for welding front fender stampings to fender rails is announced by Federal Machine & Welder Co., Warren, O. The fabricated steel main frame of the machine supports stationary die unit and houses welding transformers, clamping cylinders and sequencing control. Fabricated steel clamping arm which holds 32 spring loaded point body units is actuated by two cylinders through a



system of toggle links. The fixture stroke is from 6 to 8 inches.

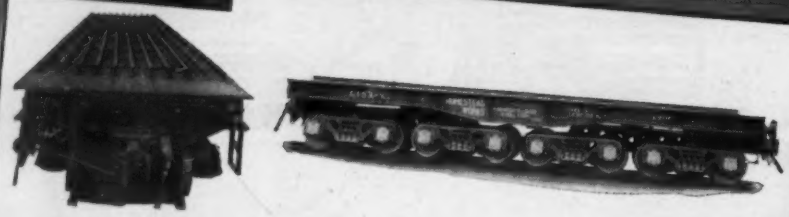
An integral hydraulic pumping unit supplies oil pressure for operating 32 double acting welding guns which are equipped with water cooled point holders and welding points. Machine has nine welding transformers, eight of which are used when making welds. Die holders and dies are interchangeable to allow for welding different sizes. Indexing of fixture, welding gun operation, welding, reversing these operations and unclamping are fully automatic.

4. Milling Machine

Two new power index type milling machines, developed by Cross Co., Detroit, Mich., machine exhaust and intake manifolds, milling stud clear-

ances and back of mounting flanges to provide a uniform contact surface when nuts and washers are assembled. Machines are capable of producing 93 pieces per hour.

Machines have hardened and ground steel ways and their motions, except work clamping, are pushbutton controlled. Each machine has three stations—the first for loading and unloading the work, second for milling back of flanges and third for form milling stud clearances. All

Practical Design
Steelcar
TRADE MARK
Dependable Performance
STEEL PLANT CARS
INGOT CAR

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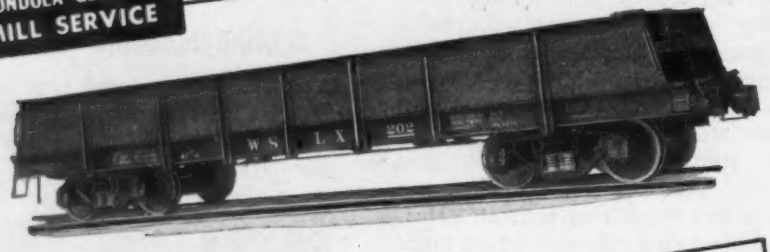
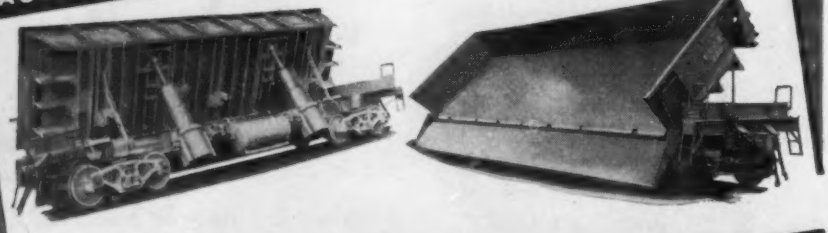
GONDOLA GENERAL MILL SERVICE

AIR DUMP AUTOMATIC

PRESSED STEEL CAR COMPANY, INC.
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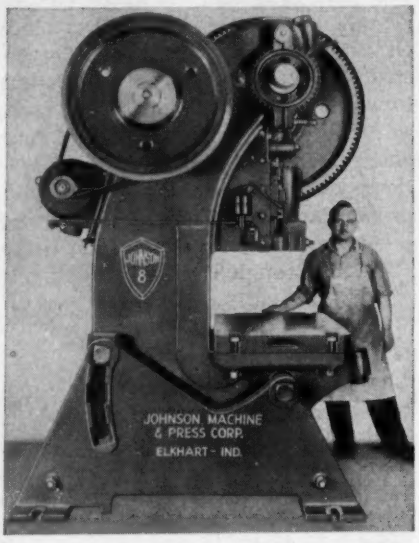
NEW YORK · CHICAGO · ST. LOUIS · ST. PAUL
MT. VERNON CAR MANUFACTURING DIVISION
Pressed Steel Car Company, Inc.
MT. VERNON, ILLINOIS

operations are performed simultaneously.

Machines utilize Cross standard machine elements; station No. 2 uses a No. 101 vertical column, station No. 3 uses a No. 26 hydraulic way type feed horizontal head. Power-driven 36-inch index table is also standard unit.

5. Inclinable Power Press

Johnson Machine & Press Corp., Elkhart, Ind., is manufacturing an inclinable power press of 90 ton capacity which may be used in the horizontal position or tilted back at a



25 degree angle so that work will drop away from the press without use of an ejector. It can handle work up to 15 inches in depth and produces 44 pieces per minute.

An extra thick bolster plate provides extra strength for heavy operations without reducing die space. An interchangeable thin steel bolster gives greater than normal die space. A tripping device protects the operator in case of spring breakage. Springs may be replaced in 30 seconds without stopping the machine. Friction type brake, within easy reach of operator, is adjusted by turning a small knob. Break-proof flywheel is equipped with tapered roller bearings.

6. Die Assembly Machine

Trying out and assembling dies, a time-consuming and hand labor job, now is possible with the Die Flipper, a one-man machine made by Moore Special Tool Co. Inc., Bridgeport, Conn. Without physical effort one diemaker can perform all the operations of die assembling—take apart, turn over, drill, tap and try

Cleco Rammers

CARRY THEIR WEIGHT... JUST GUIDE 'EM TO THE WORK!

Want fast, easy-holding rammers for either floor, flask, bench or core work? You will find exactly the right model for your job in the complete Cleco line.

In addition to being great labor savers, Cleco Rammers improve casting quality by insuring uniform mold density. All models feature end pressure-seating valves that actually improve with use. The smaller models have effective poppet type throttles, while the floor models have snap throttles—both types are trouble-and-leak-proof. Large oil chambers insure efficient lubrication at all times. *Write for Bulletin 76B.*

Chippers, grinders, core breakers and air line accessories are also included in the Cleco line for the foundry.

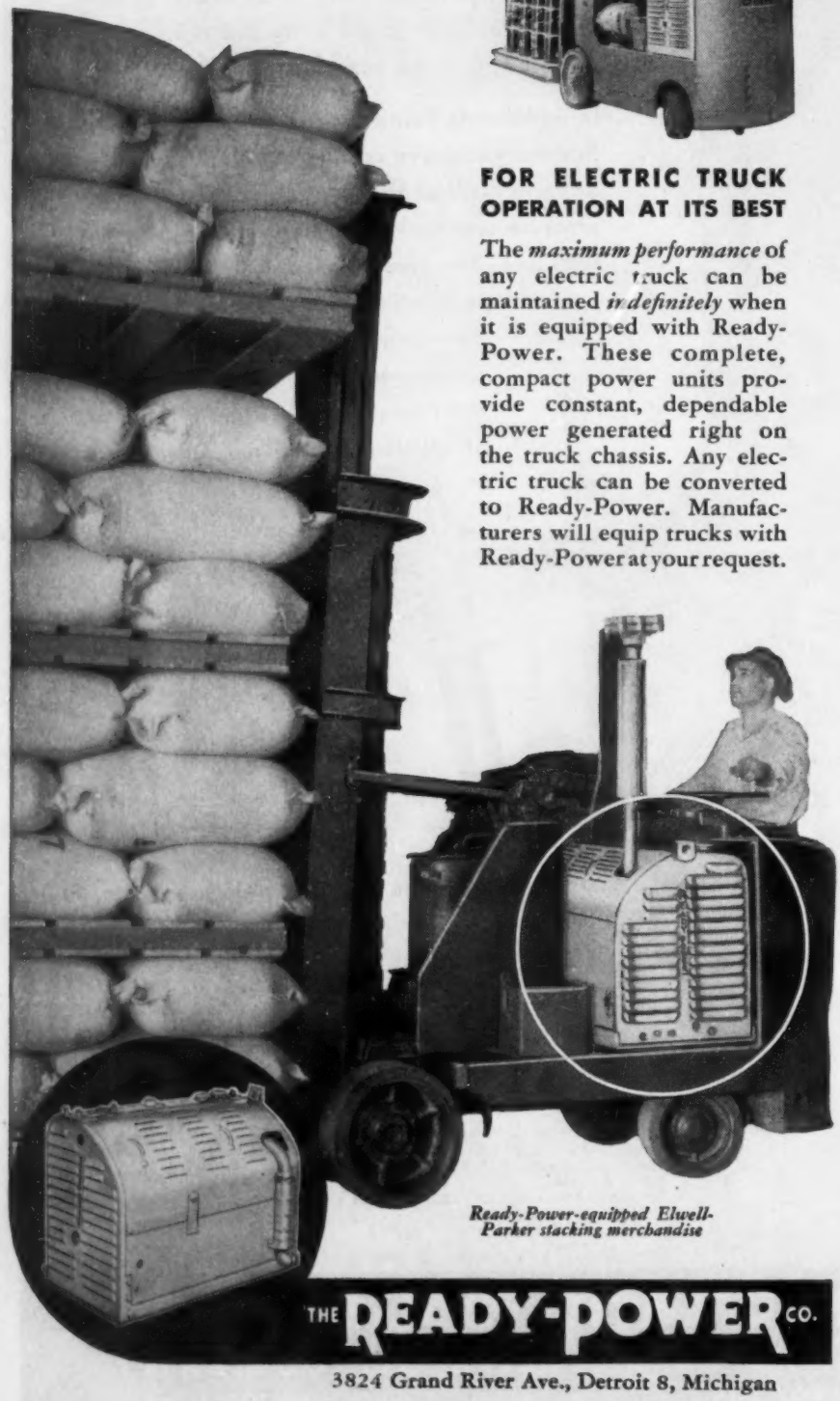
SPECIFICATIONS

	No. 0B	No. 1	No. 4B	No. 1F	No. 4	No. 5
Length (including Butt)	17"	20½"	24"	43"	48"	49"
Weight (including Butt)	5¾ lbs.	12¼ lbs.	23½ lbs.	16 lbs.	22 lbs.	33¾ lbs.
Bore and Stroke	1" x 2"	1" x 4"	1¼" x 5"	1" x 4"	1¼" x 5"	1½" x 6"
Speed in Strokes per Minute	2500	950	950	950	950	750

Cleco PNEUMATIC TOOL DIVISION
of THE REED ROLLER BIT COMPANY
P. O. BOX 2119 • HOUSTON 1, TEXAS

READY-POWER means constant power

Ready-Power-equipped Baker Industrial Fork Truck



FOR ELECTRIC TRUCK OPERATION AT ITS BEST

The *maximum performance* of any electric truck can be maintained *indefinitely* when it is equipped with Ready-Power. These complete, compact power units provide constant, dependable power generated right on the truck chassis. Any electric truck can be converted to Ready-Power. Manufacturers will equip trucks with Ready-Power at your request.

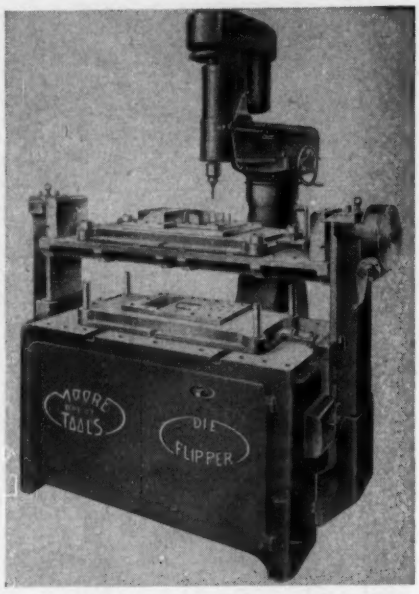
Ready-Power-equipped Elwell-Parker stacking merchandise

THE READY-POWER CO.

3824 Grand River Ave., Detroit 8, Michigan

out. Punch holder and die shoe are always clamped to the machine, preventing pinching of fingers and dropping of heavy parts.

Machine will take apart and flip over a die set 20 x 40 inches, with 12 inch shut height and pins engaged in bushings 4 inches. The platen will



hold the punch holder parallel to the die shoe under either compression or tension at all times. Another function is that of a radial drill on angular as well as straight holes. It offers speeds of 200 to 1200 revolutions per minute and drills holes up to 1½-inches.

7. Counter Cabinet

Centralized installation of electric counters is facilitated by panel mounting cabinet units developed by Production Instrument Co., 704-16 West Jackson Blvd., Chicago 6, Ill. Each cabinet unit is designed to house five Wizard electric counters which are connected and installed from the front.

Knockouts for conduit connections are provided for conduit and bolts. Cabinets are self supporting. Capacity for 100 counters requires a space measuring 56 x 40 x 5½-in.

8. Mill File Attachment

Labor, time and money are savings realized in the production of templates, punches and dies by permitting use of ordinary mill files for precision filing with index machines and Bridgeport milling machines through an attachment made by W & W Tool & Die Inc., Midland, Mich. Called the Will-Wood attachment, the device is easily and quickly installed on the machine spindle from which

There is a CHAMPION ELECTRODE for every welding job!

Mild Steel Electrodes

BLUE DEVIL	All Position, Reverse Polarity	A.W.S. 6010
BLUEDAC	All Position, A. C. Current	A.W.S. 6011
GRAY DEVIL	General Purpose, Poor Fit-up Straight Polarity	A.W.S. 6012
GRAY DEVIL No. 2	General Purpose, Smooth Bead Straight Polarity Also A.C. Current	A.W.S. 6012
GRAYDAC	General Purpose, Smooth Bead Straight Polarity Also A.C. Current	A.W.S. 6013
BLACK DEVIL	Deep Grooves and Horizontal Fillets Straight Polarity	A.W.S. 6020
RED DEVIL	Deep Grooves, Reverse Polarity	A.W.S. 6030
BLACK DEVIL F. B.	Finishing Beads for Smooth Cover Beads	A.W.S. 6030

High Tensile Electrodes

BLUE DEVIL 85	All Position, Reverse Polarity	A.W.S. 7010
BLACK DEVIL 75	Deep Grooves and Horizontal Fillets	A.W.S. 7020
RED DEVIL 75	Deep Grooves, Reverse Polarity	A.W.S. 7030

Special Electrodes and Acetylene Rods

Stainless Steel Electrodes All Types

Electrodes & Acetylene Rods for Cast Iron Welding

Bronze and Copper Alloy Electrodes and Acetylene Rods

Tool and Die Electrodes

Hard Surfacing Electrodes

Aluminum Electrodes and Acetylene Rods

High Carbon, Alloy and Manganese-Nickel Electrodes for Rail Welding

Mild Steel Bare and Lightly Coated Electrodes

Mild Steel and High Carbon Acetylene Rods

WELDING ACCESSORIES

CHIPPING GOGGLES
WELDING MACHINES: A.C. TRANSFORMER TYPES
WELDING GOGGLES • WELDING CLEANING TOOLS
WELDING CLAMPS • SAFETY CLOTHING • WELDING GLOVES
CARBON PASTE & FLUXES • WELDING CABLE CONNECTORS
WELDING CARBONS • CARBON PLATES • WELDING CABLE
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WELDING CHAMPION ELECTRODES

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IMMEDIATE DELIVERY
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LONGER WEAR AND BETTER PERFORMANCE

Made to exact specifications. The tang and hole ends are heat-treated for longer wear and maintenance of concentricity. They will outlast the ordinary soft sockets and perform with greater accuracy.

FURNISHED WITH MORSE TAPER HOLES AND SHANKS *Three Series* LONG • MEDIUM • SHORT

For details see page 215 in Scully-Jones Tool Engineering Manual 500 which shows over 500 types and sizes of cutting tools, collet chucks, boring equipment, centers, etc.

Write for a folder on Extension Sockets.

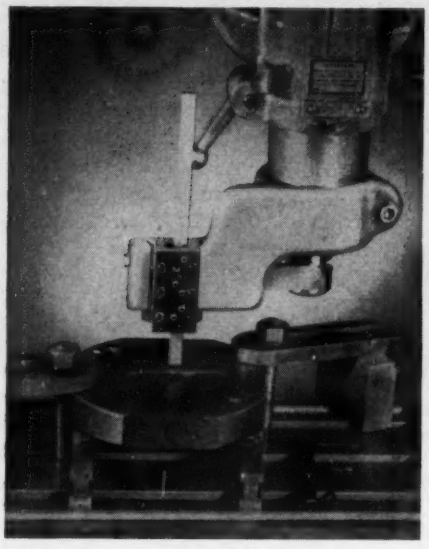
Scully-Jones AND COMPANY

1912 SOUTH ROCKWELL STREET, CHICAGO 8, ILLINOIS

6893

the cutter has been removed. It is also readily adaptable to all other types high speed heads.

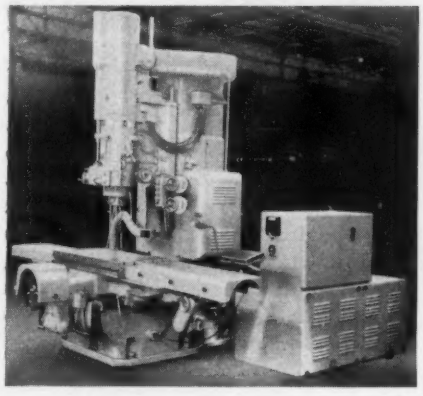
In operating, filing speed is controlled by spindle speed. The file stroke is ½-inch. When one portion of file becomes dull and unserviceable, worn end is broken off and file ad-



vanced to a new cutting position in the holder. File is held rigidly, insuring clean, sharp filing of corners, straight lands on dies and punches, contours and radii. Accuracy is limited only by accuracy of feed dials on the machine. Hones may be inserted for close work.

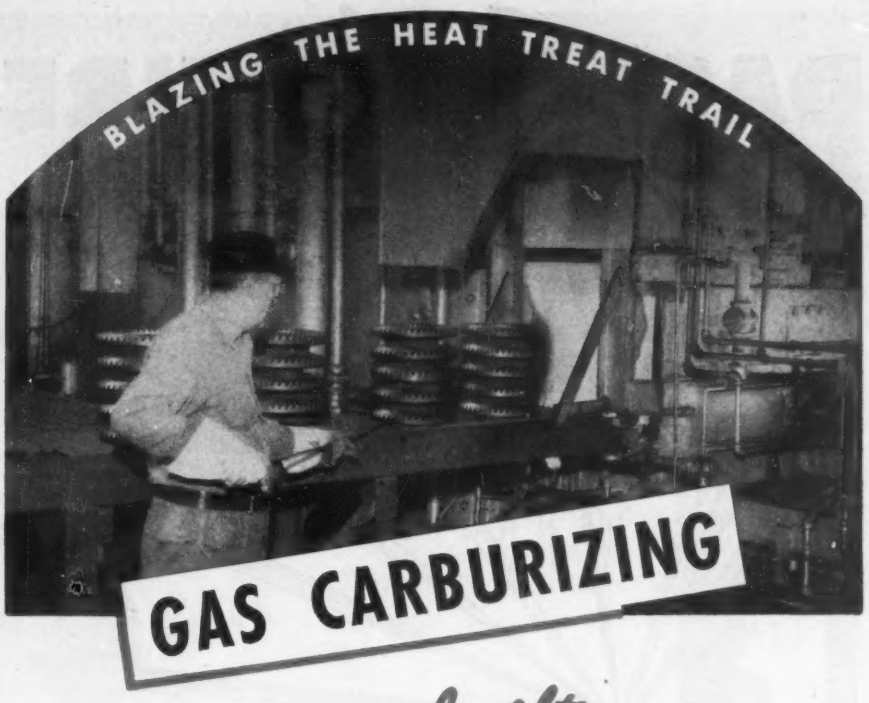
9. Jig Grinder

With a capacity to handle a wide size range of work with a table surface 22 x 44 inches, a 36-inch longitudinal travel and an 18-inch transverse travel, the new jig grinder, announced by Pratt & Whitney Division of Niles-Bement-Pond Co., West Hartford 1, Conn., has the ability to rapid-



ly remove stock and finish grind holes to precision limits.

All slides and measuring instruments are protected by hinged guards that swing up to provide access while setting. Grinding wheel head has an



Developed by Holcroft in 1935 for

MORE ACCURATE, LOWER-COST CASE HARDENING

HOLCROFT engineers established the basic principle on which *all* modern gas carburizing furnaces operate—namely, that in order to control the process, a non-decarburizing gas must be used to dilute the hydrocarbon gases which supply the carbon for carburizing. In order to *apply* this principle, Holcroft & Company in 1935 designed and built a generator to produce such a diluting gas.

This patented development—resulting from original Holcroft research—brought all the advantages of today's gas carburizing process. These include (1) accurate control of case depth and carbon content; (2) exceptionally clean, soot-free work; (3) a notable increase in furnace alloy and tray life; and (4) greater output with much less labor. Because of these advantages, gas carburizing is rapidly replacing pack carburizing throughout industry.

Further details on the process are given in the Holcroft Gas Carburizing bulletin, available on request.

The Holcroft engineering leadership which developed gas carburizing is available to serve YOU in production heat treat work of every kind. And remember—Holcroft offers you COMPLETE METALLURGICAL AND ENGINEERING SERVICE, from designing the furnace to your individual needs through the trial run in your plant. We invite your inquiries.

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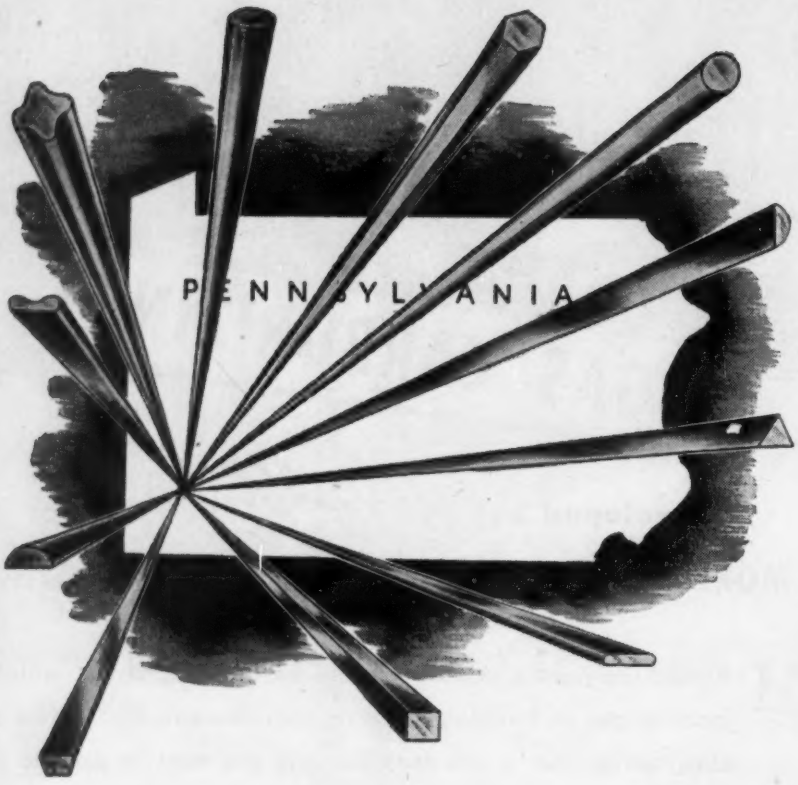
5724 Navigation Blvd.

Canada: Walker Metal Products, Ltd., Walkerville, Ontario

PAGE *Stainless Steel* WIRE



Yes, a lot of the stainless steel wire that is serving the country as part of manufactured products, came from Monessen, Pa. That's PAGE headquarters.

During the many years we have been working with stainless, we have learned much about the applications of stainless steel wire in manufacture. That's why we suggest that when you have a problem involving wire, it will pay you to . . .

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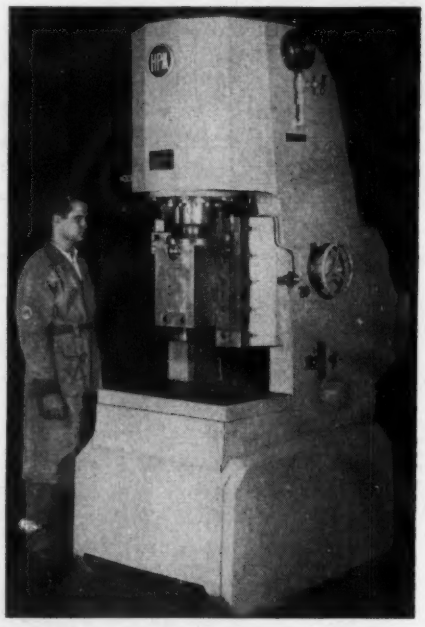
PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

adjustable circular motion about the vertical axis of the hole being ground. Main spindle is mounted on preloaded precision ball bearings, driven by a ¾-horsepower, 1200 revolutions per minute motor through a variable drive. This produces spindle speeds from 35 to 200 revolutions per minute for circular motion. A separate ½-horsepower, 900 revolutions per minute motor and variable drive provides power for the spindle vertical travel.

Grinding wheel is mounted in either of two wheel heads, both with built-in sleeve type motor. Each head has eight speeds, from 13,200 to 54,000 and from 6600 to 27,000 revolutions per minute, respectively.

10. Inclinable Press

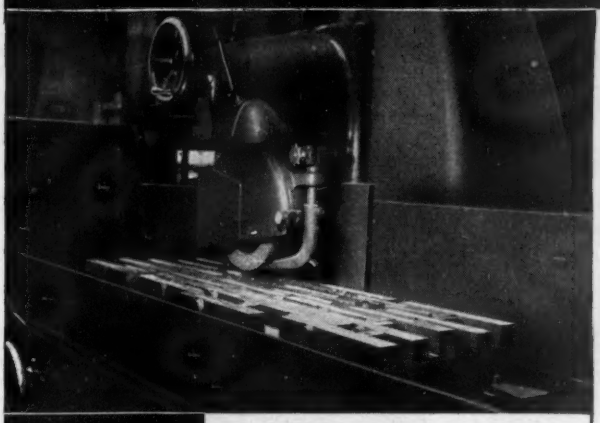
Up to 100 strokes per minute with pressures as high as 50 tons are available with the Economy high speed inclinable hydraulic press announced by Hydraulic Press Mfg. Co., Mt. Gilead, O. Built to handle a wide range



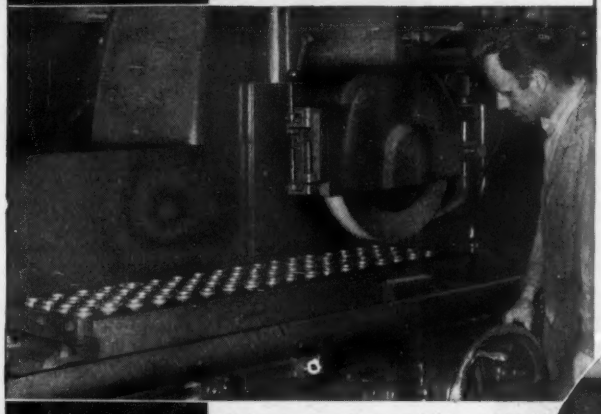
of applications, including forming, embossing, shallow drawing, blanking, flanging, multipiercing of small holes, etc., the press has a total slide stroke of 4 inches, a 4-inch slide adjustment and a full pressure slide stroke of 1 inch. Width of opening in back is 17 1/2-inches and distance between gibs is 9 1/2-inches.

Operating system of the press is all hydraulic, but a pneumatic system provides the close control at high speeds, under variable methods of operation. Controls set up any of four modes of operation: Single stroke, nonrepeat; continuous reciprocation by foot pedal; full automatic; and precision inching control. Incline position from vertical may be either 10,

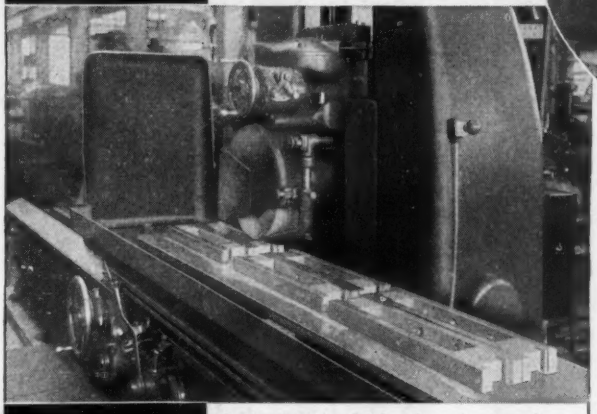
LARGE TABLE SPACE MEANS MORE PIECES PER LOAD AND GREATER PRODUCTION *with the Mattison Grinder*



● Cross Slide Draw Bars formerly ground 5 pieces at a time. Now ground on a Mattison Grinder 27 pieces per load. 50% time saving.



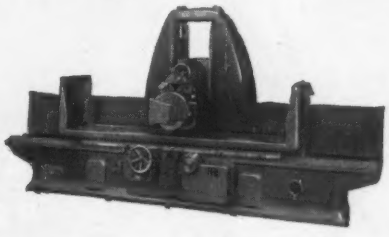
● Caps previously ground few at a time on small grinder. Now, Mattison Grinder handles 75 at a time. Time was reduced from 7 hours to 30 minutes.

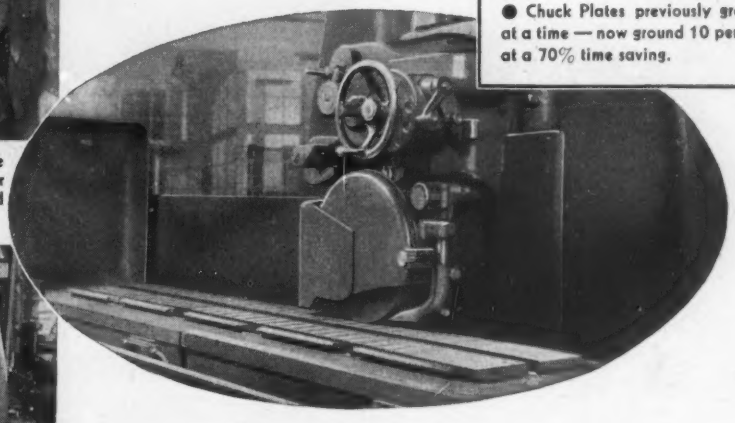


● Head Slide Guides formerly ground one at a time in 36 minutes — Now ground on a Mattison Grinder 9 pieces per set-up at a 77% time saving.

Examples: Grinding 75 pieces per load instead of 18 — cut time 80% . . . . . 10 pieces per load instead of 2 — cut time 70%, etc.

Jobs shown indicate the possibilities for increased production by handling large quantities per set-up. In your efforts to obtain maximum production and lower cost, it will pay you to check into the capabilities of the Mattison Grinder.





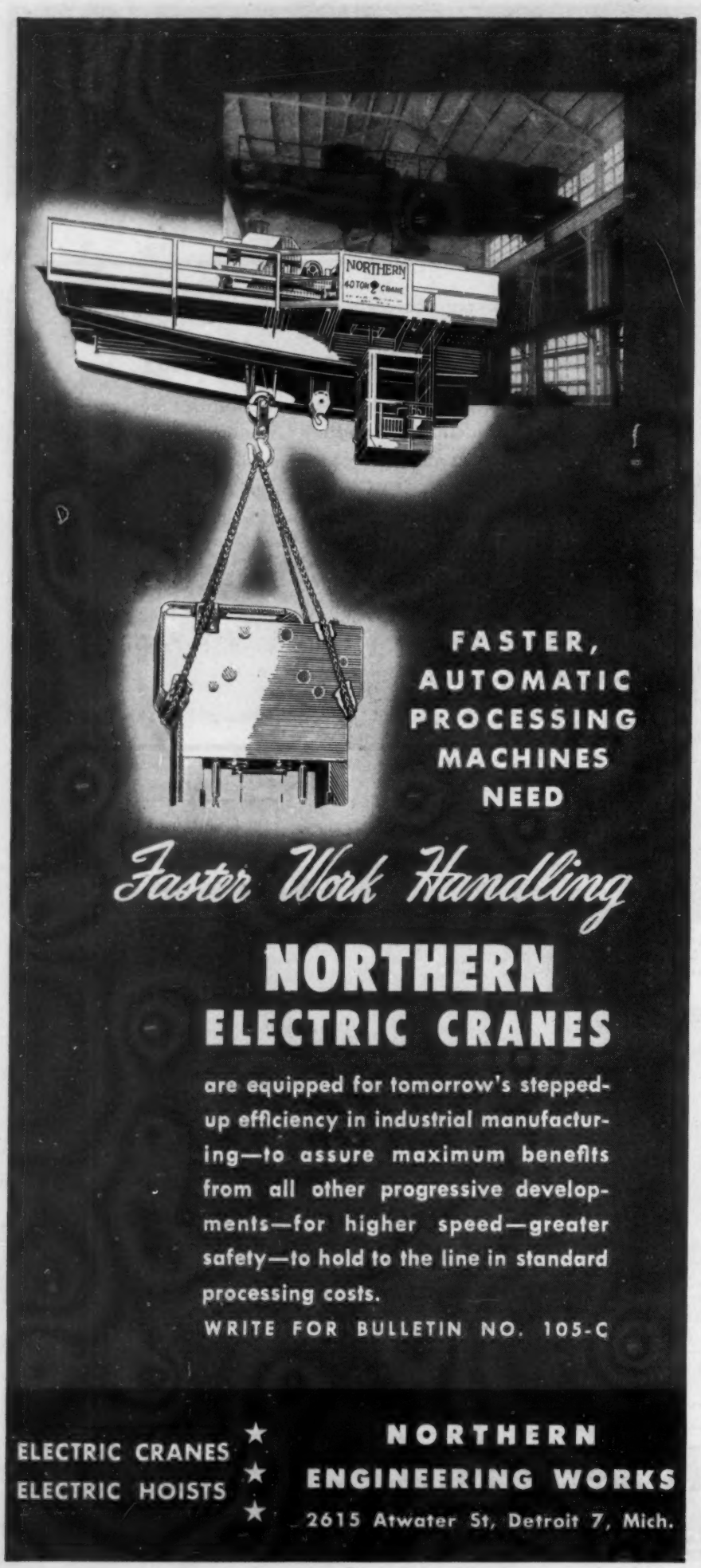
● Chuck Plates previously ground 1 at a time — now ground 10 per set-up at a 70% time saving.

ADDITIONAL INFORMATION

Also available is free Set-Up Book showing further examples of work ground on Mattison Grinders — Send for a copy today.

MATTISON MACHINE WORKS

ROCKFORD • ILLINOIS



20 or 30 degrees.

Press utilizes a fly wheel so as to use a smaller motor with a lower horsepower rating. Motor used is a 7 1/2-horsepower, 1800 revolutions per minute model.

11. Grinder

Individual arbor mounted wheels and triple speed selection are features offered in new offhand or freehand model G3 grinder announced by Corlett-Turner Co., 1001 South Kostner Ave., Chicago 24, Ill. Mounted

wheels are rapidly changed with no tool required to make the change. Three speed pulley permits selection of the right speed for any vitrified wheel from 1 to 4 inches in diameter.

Belts may be changed without removing the spindle or the bearings. Machine is also used for deburring operations, polishing and buffing. A collet type arbor increases range of usefulness of the machine. Such mounted tools as rotary files, drills and countersinks may also be used. Power is supplied by a 1/3 horsepower motor.

12. Fork Truck Lift

Combining a tiering height of 130 inches and overall collapsed height of only 83 inches, a new lifting mechanism is being introduced on the Carloader line of fork trucks manufactured by Clark Tructractor Division of Clark Equipment Co., 258 West Champion St., Battle Creek, Mich. A feature is the accomplishment of 63

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MILWAUKEE (1)	4027 West Scott St., P. O. Box 2045	MItchell 7500
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PITTSBURGH (12)	1281 Reedsdale St., N. S.	CEdar 7780
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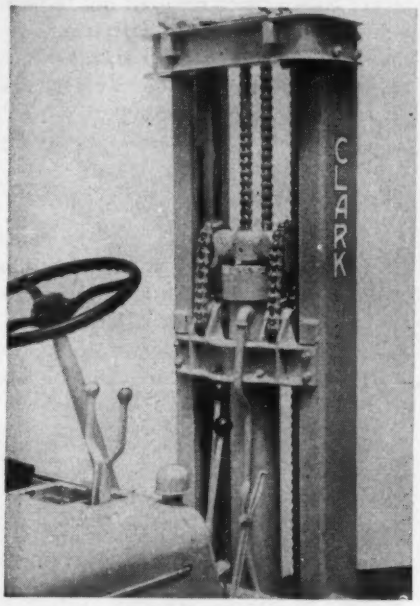
inches of "free" lift, resulting in ability to raise the fork 63 inches from the floor before there is any increase in the minimum overall height of the machine.

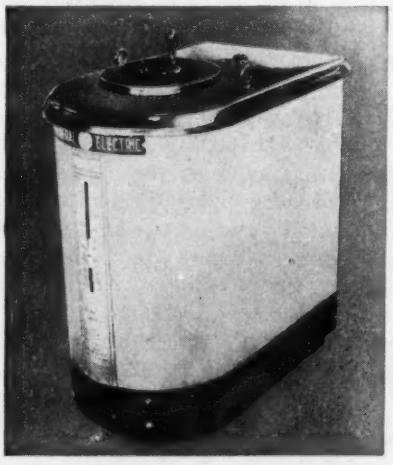
These results are obtained with a single lift cylinder and a single set of



uprights and inner slides. Lifting maximum loads of 4000 pounds is accomplished with extremely low hydraulic pressure in the lift cylinder, reducing possibility of leaks.

13. Inert Arc Welder

An alternating current welding transformer for use with the inert arc welding process is announced by Electric Welding Division of General Electric Co., Schenectady, N. Y. Suit-

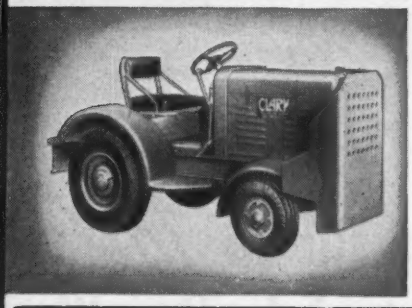


able for welding aluminum, magnesium and beryllium copper in an atmosphere of argon gas without use of a flux, the welder may also be used to weld a wide range of other metals and alloys. It is suitable for both manual and machine operation.

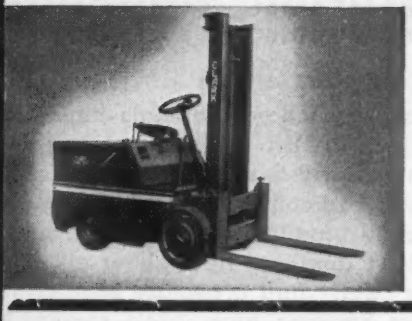
Into the single compact unit are

Cut Cost Factors with Clark Tructractors

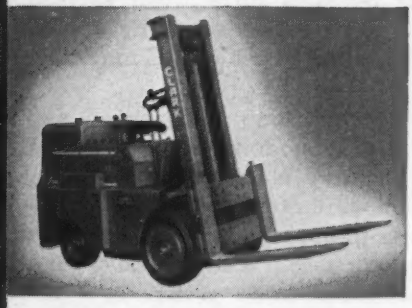
The New CLARKAT



The Famed CLARKTOR 6



Electric FORK TRUCK



Gas Powered FORK TRUCK

ABOVE EVERYTHING ELSE . . . in the material handling field, Clark Methods and Clark Machines are outstanding, permitting maximum savings in man hours and handling costs. The full story in pictures — "Material Handling News" — is yours for the asking.

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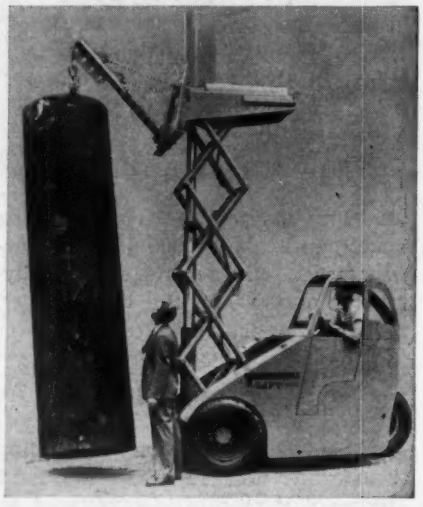
RAILWAY TRUCKS		TRANSMISSIONS

Prices on CLARK products will not be advanced in excess of increased costs.

built the welding transformer, control panel, capacitors for power factor correction, a bank of capacitors to stabilize the arc, a pilot spark circuit for arc starting and water and gas solenoid valves. Entire assembly is enclosed in a drip proof case, with electrical terminals and gas and water connections brought out to convenient outlets. After initial adjustments are made on the control panel, all components of the welder are operated by a foot treadle.

14. Lift Truck

Six thousand pounds may be lifted to a height of 8 feet or 4000 pounds lifted to 11 feet with the hydraulic lift incorporated in the lift truck produced by Mixermobile Manufacturers, Portland 16, Ore. The lift collapses



so completely that there is no track or front obstruction to prevent the truck, called the Wagnermobile Lift, from passing under low head clearance.

Weighing 7425 pounds, the machine will work inside freight cars or in other narrow, tight quarters. Attachments such as forks and scoop type buckets make possible handling of a wide variety of heavy or bulky materials. It has hydraulic steering, lift and tilt for ease of operation. An enclosed cab is available. Due to sloping front of truck, operator has unusual visibility ahead.

15. Drilling Machine

Designed as a precision tool for sensitive drilling and tapping operations at high speed, the model C-20 drilling and tapping machine announced by Sibley Machine & Foundry Corp., South Bend, Ind., obtains enough power from its 2 horsepower motor to drill a 1½-inch hole in mild

Why so much "*talk*" about Materials Handling?

In every industry today, materials handling is a very common subject for discussion. Plant engineers realize, probably more clearly than ever before, that the application of well-designed conveying equipment is a great step toward increased production and greater operating economy. There isn't anything new about efficient materials handling. For nearly half a century Mathews Conveyers and Conveyer Systems have been serving production, saving time and creating economy for manufacturers throughout the United States and Canada.

The benefit of this long and varied experience and the facilities of three modern plants is available today to both light and heavy industry. That is why, when talk turns to modern materials handling, that Mathews Conveyer service is frequently brought into the discussion — and it is quite logical that it should be — for this conveyer service is complete from preliminary engineering to erection in the field. Whatever a load weighs — whether a few pounds or many tons — there is Mathews equipment which will handle it efficiently.

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with hi-speed snap-on couplings that save time ... cut costs ... speed work

Here is a revolutionary new type of tubing with the flexibility of rubber . . . the sturdiness of steel. Ronaflex is a synthetic rubber tubing protected by strong steel braiding cover that provides extreme flexibility, tight free-flowing transmission of air, water, gases, oil, volatiles.

For quick, tight connection, Ronaflex tubing is available with hi-speed snap-on aluminum couplings that resist rust, prevent leakage, save time. Simply snap on, snap off—a one-second operation! Precision-made, they withstand severe vibration and pressures up to 500 p.s.i. without leakage.

Designers, engineers, plant managers will find Ronaflex tubing assemblies ideal for economical use everywhere: fuel and oil lines for engines, machine tool coolant lines, butane-propane gas lines, paint spraying air lines, for rapid testing operations, and countless other applications. Write for complete data. Ronaflex tubing assemblies, manufactured by the Ronaflex Tubing Co., Inc., are distributed exclusively by . . .

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● . . . saves 3 weeks with a 30 minute cut

AIRCO TECHNICAL SALES SERVICE REPORT

PROBLEM: To trim a 1" x 11" x 36" sliver off this 4200 pound, 36" x 36" x 11" slab. Local machine shops would not promise to complete the job before three weeks and estimated the cost at $90.00.

SOLUTION: We recommended they give their recently installed Airco Planograph a chance. A large size cutting tip was purchased and the entire job (including setting-up and actual cutting) was completed in 30 minutes at a cost of approximately $6.00. The speed with which the job was done saved an unestimated sum in getting this slab in production with a minimum of lost time.

A. O. Dodge.

Airco Technical Representative

Airco's Technical Sales Division is at the call of all industry in applying Airco processes and products in the solution of their problems. If you have a metal working problem. ask to have a Technical Sales Division man call. Address: Dept. S-7328, Air Reduction, 60 East 42nd St., New York 17, N. Y. In Texas: Magnolia Airco Gas Products Co., Houston 1, Texas.

Photo by W. L. Herrington, Kansas City

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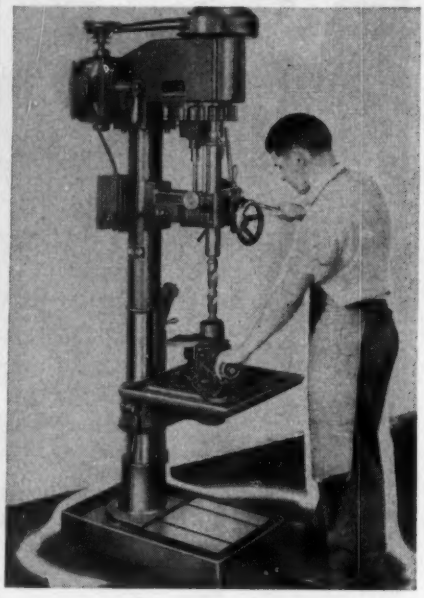
Offices in All Principal Cities

TECHNICAL SALES SERVICE – ANOTHER AIRCO PLUS-VALUE FOR CUSTOMERS

steel. Controls are arranged to cut operator time.

Selection of geared power feeds is made by turning knob. Speeds are changed quickly by a positive release lever. The eight spindle speeds available are: In back gear, 65, 95, 150 and 225 revolutions per minute; in direct drive, 400, 575, 900 and 1360



revolutions per minute. Feeds are 0.003, 0.006 and 0.010-inch. The machine has a 20-inch swing.

Drive mechanism has a double ball bearing spindle assembly, with precision ground spindle. Exact alignment of table arm with spindle is assured by boring the table arm after assembly with spindle of the machine.

16. Condensate Return System

The CBA high pressure condensate return system, development of which is announced by Cochrane Corp., 17th St. and Allegheny Ave., Philadelphia 32, Pa., accomplishes the return of condensate to even higher pressure boilers from presses, dryers and other steam heated process equipment. This unit gives added capacity with lower horsepower motor ratings.

A centrifugal pump draws water from the thermofin priming loop and discharges it as a high velocity jet through jet pump nozzle. This jet, striking the returned hot condensate, induces condensate flow through mixing tube into thermofin priming loop. Additional volume of returned condensate introduced into the constantly filled loop results in discharge of an equal volume of condensate through air separator. After air expulsion from the closed circuit, condensate is returned to the boiler at temperatures close to that of process pressure

. . . when AMERICAN PHILLIPS SCREWS Speed Assembly—Make Sturdier, Smarter TOYS

IN THE PLANT — It's a Xmas Bonus in time-savings (up to 50%) for toy manufacturers who cash in on the super fastening speed of American Phillips Screws. *Automatically* straight to drive, non-slipping, they can't harm product or personnel. Screws can't be fumbled, time can't be lost, heads can't be burred. Whether you make miniature trains or real ones, sofas or stoves, radios or refrigerators—output and savings go *up* when American Phillips Screws go *in!*

IN THE SHOWROOM — Toys (or whatever you make) have both a "can take it" and "take me with you" look! For children and grown-ups, there's the safety, non-snagging feature. American Phillips Screws join your sales promotion staff, make your product sturdy, eye and buy-appealing. And more and more buyers know it!

AMERICAN SCREW COMPANY, PROVIDENCE 1, RHODE ISLAND

Chicago 11: 589 E. Illinois St. *Detroit 2:* 502 Stephenson Building

4-WINGED DRIVER CAN'T SLIP OUT OF PHILLIPS TAPERED RECESS

AMERICAN PHILLIPS *Screws*

ALL TYPES

ALL METALS: Steel, Brass, Bronze, Stainless Steel, Aluminum, Monel, Everdur (silicon bronze)

without flash loss and with savings in fuel.

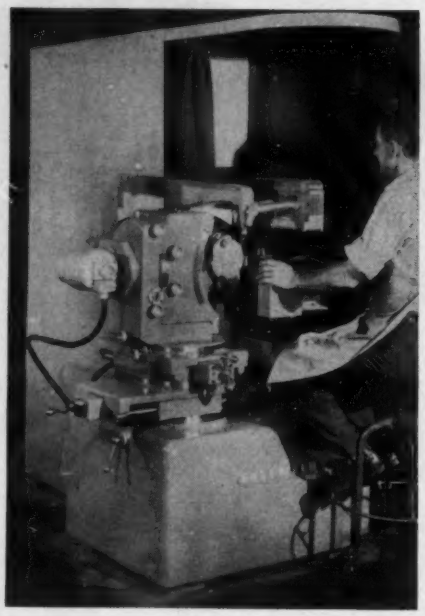
17. Motor Controller

One horsepower motor controllers for medium industrial or work shop equipment are available in four switching arrangements from Furnas Electric Co., 449 McKee Street, Batavia, Ill. Designated as series A, the controllers have the following switching arrangements: Reversing, two speed, series-parallel and 3-pole off-on.

Controllers have plastic case, handle and contact rotor and may be mounted in several different manners. They are rated at 1 hp, single and 3-phase, 110 to 550 v ac or ¼ hp, 115 to 230 v dc. Noninductive loads are 10 amp, 110 v ac, 5 amp 220 v ac.

18. Grinder

An optical system which uses either contour or opaque projection with surface illumination to project an image of a part being ground is a feature of the Projectoform grinder offered by Sheffield Corp., Dayton 1, O. Magnification may be either 25 to 1 or 50 to 1. A prism incorporated in the optical system places the image in a natural position with the work so that confusing opposites in move-



ment of work and projection are avoided.

All moving ways of the grinder are sealed with antifriction bearings. Remote movement of the wheel head is accomplished hydraulically, allowing the operator to sit before the projection screen while operating the micrometer wheels. He can see the work and wheel in natural colors highly amplified on the screen at all times.

19. Counterbore

Extra long blades and a radial ground subland pilot built into the entire length of the tool are features of the new type high speed steel counterbore announced by Mohawk Tool Co., 21679 Dequindre road, Hazel Park, Mich. As blades are sharpened a pilot already ground to size is automatically developed. If a long pilot is desired blades may be ground back to provide it, or pilot may be ground to desired length as tool is used if a short pilot is required.

20. Trimming Press

Forged steel side frames are tongued and grooved to bind base and yoke into a rigid unit, and all parts of the improved trimming press, built by Chambersburg Engineering Co., Chambersburg, Pa., are designed to withstand overloads. Forged steel side construction and friction slip mechanism which per-

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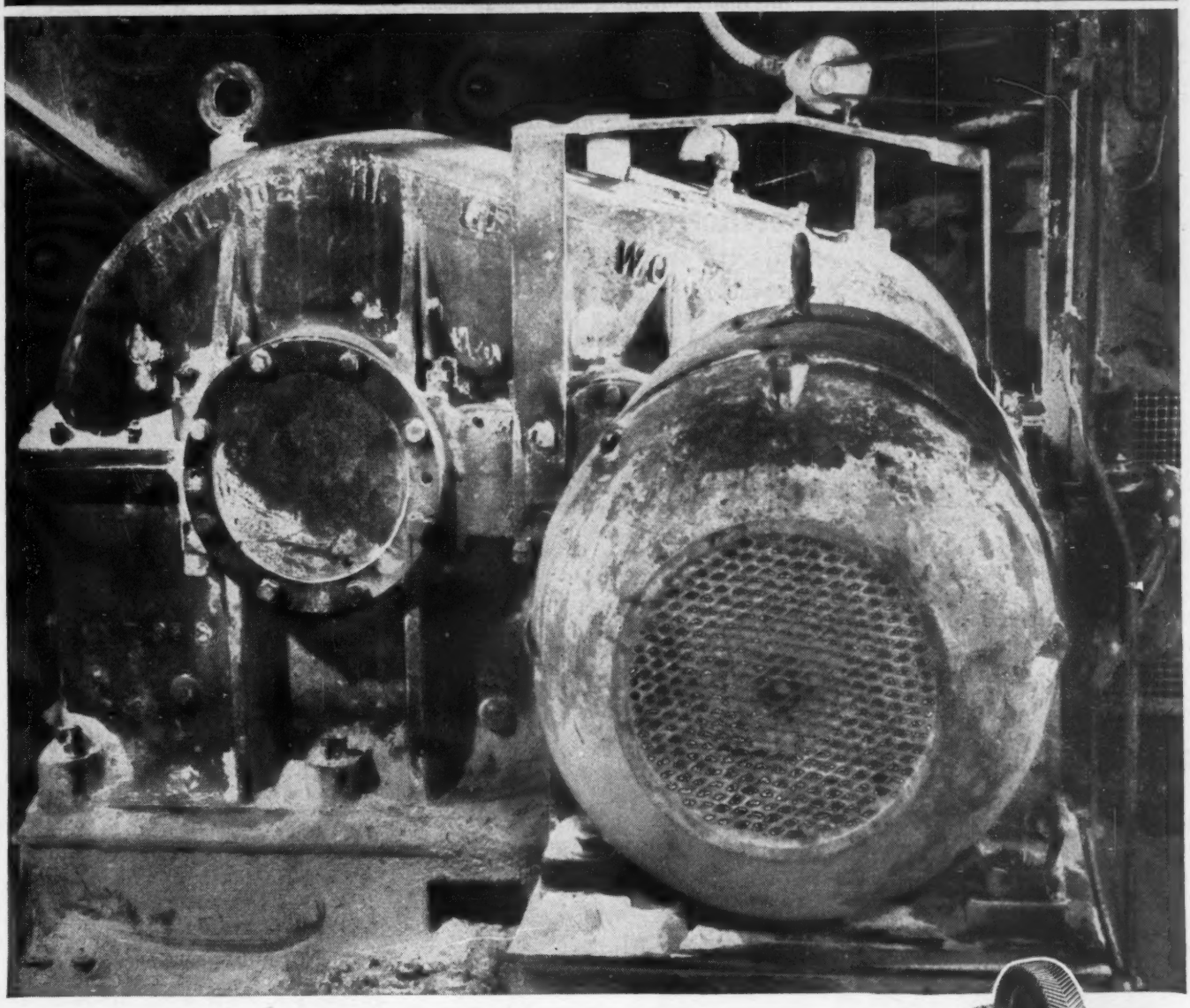
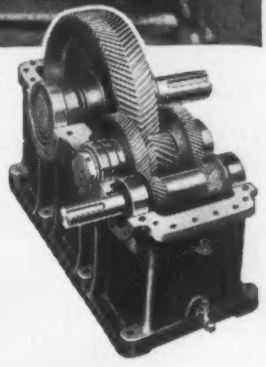
THIS PHILADELPHIA HERRINGBONE REDUCER *really takes a "TERRIFIC BEATING"...*





The unit shown above is a Philadelphia Double Reduction Herringbone Speed Reducer, driving a 36" drag conveyor on a lime kiln discharge . . . reduction ratio 53 to 1. It operates almost continuously under severe conditions of heavy load, dust, abrasion and dirt, . . . yet is always on the job, and has been for many years.

Philadelphia Herringbone Units are used by thousands, and are available in Single, Double and Triple types. Send for Catalog #H-39, and please use your Business Letterhead when requesting same.

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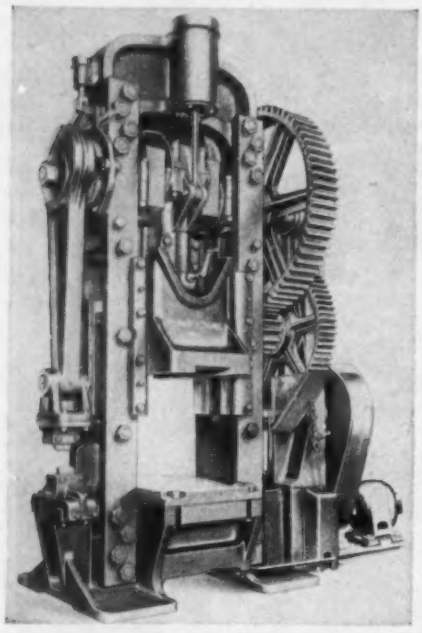
Industrial Gears and Speed Reducers
LimiTorque Valve Controls

mits the flywheel to expand its energy at predetermined loads make the press practically unbreakable.

Interlocking frame construction prevents sway. Designed primarily for trimming in the forge shop, it is



also being used for all forms of blanking, punching, bending and shaping. Arrangement of flywheel and gearing at side of press has made easy accessibility to front and back.

21. Hand Grinder

Smooth, vibrationless operation at high speed with ample power for various jobs are advantages of the improved heavy duty grinder manufactured by Duro Metal Products Co.,

2651 North Kildare Ave., Chicago 39, Ill. Fitting into the operator's hand, the grinder utilizes a universal motor which develops 42 watts output at approximately 20,000 revolutions per minute. It operates on 60 cycles or less, alternating or direct current.

Sealed ball bearings that take up all thrust and radial loads carry the spindle. A propeller type fan pulls large volume of air over motor for cooling. Threaded type collet chuck overhangs housing only 5/16-inch, making it easier to do delicate, precision work. Two collets, one for 3/32-inch shanks and one for ⅛-inch shanks are included. Grinders operate at 110 volts, with 220 volts supplied at extra cost.

DEVELOPED BY . . .

22. Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa., a Dust-Vue microprojector. Instrument is used to determine numerical concentrations of dust samples. Portable device has 1000 magnification.

23. Wolverine Tool Co., 1480 East Woodbridge, Detroit 7, Mich., safety tongs with a finger guard. They may be used in handling material on punch presses and other operations.

24. Willey's Carbide Tool Co., 1340 West Vernor highway, Detroit 1, Mich., new grade 606 carbide for machining all types of steel. It is furnished in standard tools, specials or blanks.

25. Acme Tinning & Lead Coating Co., 1126 Marshall Ave., Cincinnati 25, O., a soldering oil, SO3. For various metals, it works quickly, safely and without discoloration.

26. Amercoat Division of American Pipe & Construction Co., P. O. Box 3428, Terminal Annex, Los Angeles 54, Calif., No. 1132 silicon resin stack coating. It will withstand temperatures to 600° F in diesel exhaust pipes, boiler breechings, stacks, etc.

27. Beryllium Corp., Reading, Pa., a general purpose beryllium-copper alloy, Berylco 165. Alloy combines good formability with inherent physical properties. Various forms are available.

28. HPL Mfg. Co., 2013 East 65th St., Cleveland 3, O., an expander for leather cup packings in strip form. Fitting any cup diameter 2 inches or over, it is made of beryllium copper strip.

29. Kennametal Inc., Latrobe, Pa., a roughing roll-turner tool. Designated as RRT, tool comprises a series of replaceable cemented carbide disks on a heat treated shank. Four to 10 inch widths offered.

30. Duriron Co. Inc., Dayton 1, O., a Hills-McCanna Saunders valve of diaphragm type. Bodies are of corrosion resisting Duriron and Durichlor and sizes from 1 to 6 inches are made.

31. Rite-O Tool & Gage Co., 59 East Eight Mile Rd., Hazel Park, Mich., shock proof, peelproof plug gages. They are made with an alloy bonded to steel base or shank.

32. Metron Instrument Co., 432 Lincoln St., Denver 9, Colo., a tachometer angle adapter. Designated as type 45, it permits speed measurement in cramped quarters with as little as 2 inches end clearance.

33. American Solder & Flux Co., Philadelphia 25, Pa., a combination fluxing and brazing compound. It may be used with torch, furnace or induction heating in gang brazing operations.

34. Precision Apparatus Co. Inc., 92-27 Horace Harding Blvd., Elmhurst, N. Y., a Multi-Master series 858 test set for electronic circuits. It is a sensitive 20,000 ohms per volt, high speed set.

35. Manhattan Rubber Division of Raybestos-Manhattan Inc., Passaic, N. J., an oil resisting tool hose. Also made with rayon strength members, it is made in sizes from ¼ to ½-inch for small tools.

36. Welding Equipment & Supply Co., 223 Leib St., Detroit 7, Mich., welding and brazing fluxes. Giving off no fumes, gases, red flames or smoke, they are offered for a variety of metals.

37. Wm. A. Force & Co., 216 Nichols Ave., Brooklyn 8, N. Y., a model 23 indenting numbering head. For hand or power press operation, it will automatically or nonautomatically number metals and other materials.

38. Michigan Chrome & Chemical Co., 6340 East Jefferson Ave., Detroit 7, Mich., Microstop stop-off lacquer for selective plating. Made of synthetic resins, it may be applied by brush, dip or spray.

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

Scrap Advance Temporarily Halts on Buyer Resistance

Steelmaking grades off $3 to $4 on representative sales as mills present firm front to runaway market. Ultimate outcome of corrective action uncertain with winter threatening to intensify supply shortage. Pressure on steel price structure eased for present. First quarter steel product quotas hold

CONFUSION in the iron and steel scrap market arising from the current uncertainty over prices has seldom, if ever before, been equalled.

The pulling and hauling going on in this market as buyers and sellers jockey for position is really something to contemplate with concern. In the absence of active trading in the steelmaking grades, leading steel producers having withdrawn from the market as buyers, the exact level of prices is almost impossible of determination.

Last week the market apparently settled back to a level of $40, Pittsburgh, and $39, Chicago, on steelmaking grades on representative sales to mills. This was $3 to $4 a ton under peak prices established the week preceding. However, there was no certainty these prices did more than reflect determined efforts of buyers and sellers to effect correction of a market situation loaded with inflationary dynamite. Certainly they provided no assurance that the inflationary tide had been definitely stemmed in the face of a well-recognized supply shortage which promises to become even more acute when snow begins to fly.

Brokers claim they are having difficulty covering commitments under $40 and are fearful another surge in prices will accompany resumption of active buying on the part of the mills. Unless the mills can hold buying pressure on the market at a minimum, many observers think prices cannot be held back indefinitely, short of government control.

With scrap idling around the $40 level established last week threat of an early advance in finished steel prices, especially by the smaller, nonintegrated producers, has eased somewhat. However, the continued strong position of scrap and the fact that housing subsidies on pig iron possibly may expire around the turn of the year opens the possibility of further compensating upward price adjustments in raw materials which would present a distinct threat to continued steel product price stability.

First quarter 1948 steel shipment quotas are being set up by an increasing number of mills, affecting practically all products. Certain large producers have not yet taken action, but this should come within a relatively few days. Indications point to about the same general overall quotas as rule currently.

Tight situation in raw materials shows little promise of easing over coming months. Not much gain in output of pig iron appears in prospect. In fact with some furnaces scheduled to go down for repairs the stringency may become even more acute.

Steel production on a tonnage basis was only fractionally under the all-time record high last week. The estimated national ingot rate advanced 1 point to 96.5 per cent of capacity, gains being recorded of 7 points to 94 per cent in Cincinnati, 6 points to 80 per cent in St. Louis, 2½ points to 92.5 per cent in Cleveland, 2 points to 86 per cent in New England, and ½ point to 92 per cent in eastern Pennsylvania. The only reduction registered was in the Chicago area where the rate eased ½ point to 94.5 per cent.

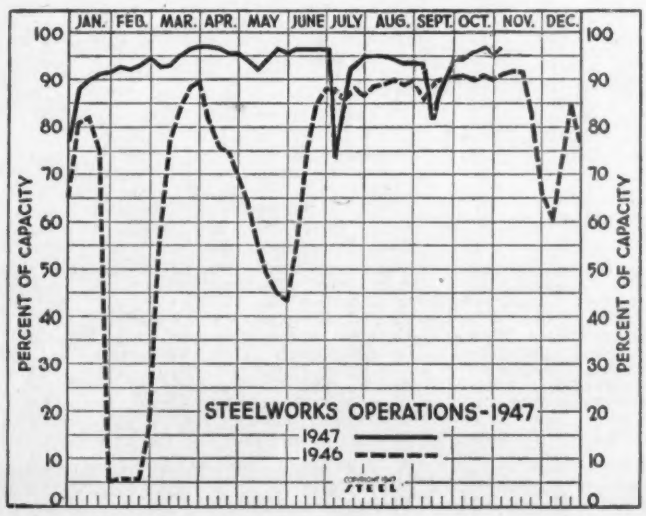
STEEL's composite price average for steelmaking scrap eased last weak to $40.25, decline of $2.33 from the previous week, making the average for the month $39.85 compared with $37.83 in September. Reflecting an advance in the pig iron price at Cleveland, where one interest's quotations are tied to heavy melting steel scrap, the composite price average for steelmaking pig iron rose 25 cents to $36.38, making the month's average $36.18 compared with $36.14 for September. Composite price averages held unchanged throughout October on finished steel at $75.41, and on semifinished steel at $56.80.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Nov. 1	Change	Same Week 1946	Same Week 1945
Pittsburgh	104	None	98.5	72.5
Chicago	94.5	— 0.5	92.5	73.5
Eastern Pa.	92	+ 0.5	78	74
Youngstown	92	None	91	54
Wheeling	93.5	None	81.5	86.5
Cleveland	92.5	+ 2.5	89	83
Buffalo	88.5	None	88.5	81.5
Birmingham	99	None	99	95
New England	86	+ 2	90	80
Cincinnati	94	+ 7	88	71
St. Louis	80	+ 6	65.5	68
Detroit	86	None	91	92
Estimated national rate	96.5	+ 1	91	73

Based on weekly steelmaking capacity of 1,749,928 net tons for 1947; 1,762,381 net tons for 1946; 1,831,636 tons for 1945.



COMPOSITE MARKET AVERAGES

	Nov. 1	Oct. 25	Oct. 18	One Month Ago Oct., 1947	Three Months Ago Aug., 1947	One Year Ago Nov., 1946	Five Years Ago Nov., 1942
Finished Steel	$75.41	$75.41	$75.41	$75.41	$75.41	$64.45	$56.73
Semifinished Steel	56.80	56.80	56.80	56.80	56.80	40.60	36.00
Steelmaking Pig Iron	36.13	36.13	36.13	36.13	36.06	27.50	23.00
Steelmaking Scrap	40.25	42.58	39.75	39.85	39.00	22.22	19.17

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished material (except tin plate) and wire rods, cents per lb; coke, dollars per net ton; others, dollars per gross ton.

Finished Materials

	Nov. 1, 1947	Oct., 1947	Aug., 1947	Nov., 1946
Steel bars, Pittsburgh	2.90c	2.90c	2.90c	2.50c
Steel bars, del. Philadelphia	3.318	3.301	3.28	2.86
Steel bars, Chicago	2.90	2.90	2.90	2.50
Shapes, Pittsburgh	2.80	2.80	2.80	2.35
Shapes, del. Philadelphia	2.954	2.947	2.94	2.48
Shapes, Chicago	2.80	2.80	2.80	2.35
Plates, Pittsburgh	2.95	2.95	2.95	2.50
Plates, del. Philadelphia	3.17	3.162	3.15	2.558
Plates, Chicago	2.95	2.95	2.95	2.50
Sheets, hot-rolled, Pittsburgh	2.80	2.80	2.80	2.425
Sheets, cold-rolled, Pittsburgh	3.55	3.55	3.55	3.275
Sheets, No. 10 galv., Pittsburgh	3.90	3.90	3.90	†4.05
Sheets, hot-rolled, Gary	2.80	2.80	2.80	2.425
Sheets, cold-rolled, Gary	3.55	3.55	3.55	3.275
Sheets, No. 10 galv., Gary	3.90	3.90	3.90	†4.05
Strip, hot-rolled, Pittsburgh	2.80	2.80	2.80	2.45
Strip, cold-rolled, Pittsburgh	3.55	3.55	3.55	3.05
Bright basic, bess. wire, Pittsburgh	3.675	3.675	3.675	3.05
Wire nails, Pittsburgh	4.25	4.25	4.25	3.75
Tin plate, per base box, Pittsburgh	$5.75	$5.75	$5.75	*$5.25

* Nominal. † Base, No. 24 gage.

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$60.00	$60.00	$60.00	$38.00
Slabs, Pittsburgh, Chicago	47.50	47.50	47.50	39.00
Rerolling billets, Pittsburgh	47.50	47.50	47.50	39.00
Wire rod $\frac{5}{16}$ to ¼-inch, Pitts.	2.925c	2.925c	2.925c	‡2.30c

‡ Base, No. 5 to $\frac{5}{16}$-in.

Pig Iron

	Nov. 1, 1947	Oct., 1947	Aug., 1947	Nov., 1946
Bessemer, del. Pittsburgh (N.&S. sides)	$37.913	$37.879	$37.83	$29.77
Basic, Valley	36.00	36.00	36.00	28.00
Basic, eastern del. Philadelphia	38.84	38.78	38.72	29.93
No. 2 fdry., del. Pgh. (N.&S. sides)	37.41	37.379	37.33	29.27
No. 2 fdry., del Philadelphia	39.34	39.28	39.22	30.43
No. 2 foundry, Chicago	36.00	36.00	36.00	28.50
No. 2 foundry, Valley	36.50	36.50	36.50	28.50
Southern No. 2, Birmingham	34.88	34.88	34.51	24.88
Southern, No. 2, del. Cincinnati	38.74	38.544	39.38	28.94
Malleable, Valley	36.50	36.50	36.50	28.50
Malleable, Chicago	36.50	36.50	36.50	28.50
Charcoal, low phos., fob Lyles, Tenn.	50.00	46.40	44.00	33.00
Ferromanganese, fob cars, Pittsburgh	151.00	151.00	140.25	140.00

Scrap

Heavy melt. steel, No. 1, Pittsburgh	$40.00	$39.90	$39.50	$23.00
Heavy melt. steel, No. 2, E. Pa.	42.00	39.50	38.35	21.90
Heavy melt. steel, No. 1 Chicago	38.75	40.35	39.625	21.75
Heavy melt. steel, No. 1, Valley	43.00	39.50	40.50	20.00
Heavy melt. steel, No. 1, Cleveland	41.875	38.25	38.81	19.50
Heavy melt, steel, No. 1, Buffalo	42.50	39.00	40.88	19.25
Rails for rerolling, Chicago	55.50	50.60	47.125	24.25
No. 1 cast, Chicago	49.00	46.30	43.50	29.00

Coke

Connellsville, beehive furnace	$12.25	$12.15	$12.00	$8.75
Connellsville, beehive foundry	14.50	14.50	14.50	9.50
Chicago, oven foundry, del.	18.60	18.52	18.50	15.10

FINISHED AND SEMIFINISHED IRON, STEEL PRODUCTS

Finished steel quoted in cents per pound and semifinished in dollars per gross ton, except as otherwise noted. Prices apply on an individual producer basis to products within the range of sizes, grades, finishes and specifications produced at its plants. Delivered prices do not include the 3 per cent federal tax on freight.

Semifinished Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, open market, $80-$85. Forging quality $46, Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown.

Alloy Steel Ingots: Pittsburgh, $56.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, $45-$50, sales by smaller interests on negotiated basis at $65 or higher.

Forging Quality Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, $55-$58; Detroit, del., $61; eastern Mich., $62.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $66, del. Detroit $69, eastern Mich., $70.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Youngstown, $60; sales in open market $66 to $92.

Skelp: Pittsburgh, Youngstown, 2.60c-2.65c per lb.

Tube Rounds: Pittsburgh, Chicago, Gary, Cleveland, $69-$70.

Wire Rods: Pittsburgh, Chicago, Birmingham, $\frac{5}{16}$ to ¼-in., inclusive, $2.80-3.05 per 100 lb. $\frac{5}{16}$ to $\frac{47}{64}$-in., inclusive, $2.75, Cleveland; Galveston, $2.95; Worcester, $2.90-2.95. San Francisco (base del.), $3.52.

Bars

Hot-Rolled Carbon Bars (O.H. only) and Bar-Size Shapes under 3-in.: Pittsburgh, Youngstown, Chicago, Gary, Cleveland, Buffalo, Birmingham, base, 20 tons one size, 2.90c; Detroit, del., 3.05c; eastern Mich., 3.10c; New York, del., 3.31c; Phila., del., 3.318c; San Francisco (base, del.), 3.63-3.95c; Los Angeles (base, del.), 3.625-3.86c; Seattle, 3.85c, base.

Rail Steel Bars: Same basing points as merchant carbon bars, except base is 10 tons. Prices upon application.

Hot-Rolled Alloy Bars: Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 3.30c; Detroit, del., 3.45c; eastern Mich., 3.50c. (Texas Steel Co. uses Chicago base price as maximum fob Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lb., 3.55c; Detroit, del., 3.70c; Toledo, 3.75c.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Canton, base, 4.10c; Detroit, del., 4.25c; eastern Mich., 4.30c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base, 2.75c; San Francisco (base, del.), 3.33c; Los Angeles (base, del.), 3.325c; Seattle, 3.88c, base.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo. Prices upon application.

Iron Bars: Single refined, Pittsburgh 7.15c-†7.70c; double refined, 8.00-†9.75c; Pittsburgh, staybolt, 8.85c-†11.25c.

† Hand puddled.

Sheets

Hot-Rolled Sheets (18 gage and heavier): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Point, Ashland, Ky., base, 2.80c; Granite City, 3.175c; Detroit, del., 2.95c; eastern Mich., del., 3.00c; Philadelphia, del., 3.02c; New York, del., 3.12c; Los Angeles (base, del.), 3.54c; San Francisco, (base, del.), 3.545c. (Andrews Steel Co. quotes Middletown, O., base for shipment to Detroit. Alan Wood Steel Co., Conshohocken, Pa., quotes 3.40c, Sparrows Point equivalent).

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.55c; Granite City, 3.65c; Detroit, del., 3.70c; eastern Mich., del., 3.75c; New York, del., 3.96c; Philadelphia, del., 3.968c.

Galvanized Sheets, No. 10: (Based on 5 cent zinc) Pittsburgh, Chicago, Gary, Birmingham, 3.85c-3.95c; Youngstown, Sparrows Point, Canton, Middletown, base, 3.95c; Granite City, 4.05c; New York, del., 4.27c; Philadelphia, del., 4.17c; Los Angeles (base, del.), 4.62c; San Francisco (base, del.), 4.625c.

Corrugated Galvanized Sheets, No. 10: (Based on 5 cent zinc) Pittsburgh, Chicago, Gary, Birmingham base, 3.95c-4.05c.

Culvert Sheets, No. 16 flat: (Based on 5 cent zinc; corrugated 10 cents extra) Pittsburgh, Chicago, Gary, Birmingham: Copper alloy, 4.45c-4.55c; copper-iron or pure iron, 4.80c-4.90c. Granite City 4.65c and 5.00c, respectively. Los Angeles (base, del.), 5.24c; San Francisco (base, del.), 5.245c.

Aluminized Sheets: Hot-dipped, coils or cut to lengths: Pittsburgh, 7.50c.

Stainless-Clad 20%: Pittsburgh, Washington, Coatesville, Pa., No. 304, 22.00c; No. 410, 20.00c; No. 430, 20.50c; No. 446, 27.00c. Prices include annealing and pickling.

Long Ternes, No. 10: Pittsburgh, Chicago, Gary, base, 3.85c-4.05c.

Enameling Sheets, No. 12: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 3.90c-3.95c; Granite City, 4.05c; Detroit, del., 4.10c; eastern Mich., 4.15c.

Electrical Sheets, No. 24: Field: Pittsburgh, Chicago, Gary, 4.50c; Kokomo, Ind., 4.60c. Armature: Pittsburgh, Chicago, Gary, 4.80c; Granite City, Ill., Kokomo, Ind., 4.90c. Electrical: Pittsburgh, Chicago, Gary, 5.30c; Granite City, Kokomo, 5.40c. Motor: Pittsburgh, Chicago, Gary, 6.05c; Granite City, 6.15c. Dynamo: Pittsburgh, 6.75c; Granite City, 6.85c. Transformer 72, 7.25c; 65, 7.95c; 58, 8.65c; 52, 9.45c, Pittsburgh.

Strip

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Birmingham, Youngstown, base, 2.80c; Detroit, del., 2.95c; eastern Mich., del., 3.00c; San Francisco (base, del.), 3.605c; Los Angeles (base, del.), 3.60c.

Cold-Rolled Strip: 0.25 carbon and less: Pittsburgh, Cleveland, Youngstown, 3.55c; Chicago, base, 3.65c; Detroit, del. 3.70c; eastern Mich., 3.75c; Worcester, base, 3.75c-4.10c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland base: 0.26-0.40 carbon, 3.55c; over 0.40 to 0.60 carbon, 5.05c, over 0.60 to 0.80, 5.65c; over 0.80 to 1.05, 7.15c; over 1.05 to 1.35, 9.45c; add 0.20c for Worcester.

Tin, Terne, Plate

Tin Plate: Pittsburgh, Chicago, Gary, Warren, O., 100-lb base box, $5.75; Granite City, Birmingham, Sparrows Point, $5.85.

Electrolytic Tin Plate: Pittsburgh, Gary, Warren, O., 100-lb base box 0.25 lb tin, $4.85; 0.50 lb tin, $5.05; 0.75 lb tin, $5.25; Granite City, Birmingham, Sparrows Point, $4.95, $5.15, $5.35, respectively.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, Warren, O., base 29-gage and lighter, 3.90c; Granite City, Birmingham, Sparrows Point, 4.00c.

Manufacturing Ternes (Special Coated): Pittsburgh, Chicago, Gary, 100-lb base box $4.90; Granite City, Birmingham, Sparrows Point, $5.00.

Roofing Ternes: Pittsburgh, per package 112 sheets; 20 x 28 in., coating I.C. 8-lb $14.10.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, 2.95c; Coatesville, Claymont, 3.15c; Geneva, Utah, (base, del.), 3.125c; New York, del. 3.27c; Phila., del., 3.17c; St. Louis, del., 2.77c; Boston, del., 3.423c; San Francisco and Los Angeles, del., 3.67c for sizes and grades produced at Geneva, 3.76c for sizes and grades produced at Fontana, Calif.

(Central Iron & Steel Co., Harrisburg, Pa., 4.45c, basing points.)

Floor Plates: Pittsburgh, Chicago, 4.20c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, 3.80c-4.137c; Coatesville, 4.50c.

Clad Steel Plates: Coatesville, 10% cladding: Nickel clad, 21.50c; inconel-clad, 30.00c; monel-clad, 29.00c. Pittsburgh, Washington, Coatesville, Pa., 20% stainless-clad, base prices including annealing and pickling: No. 304, 24.00c; No. 410, 22.00c; No. 430, 22.50c; No. 446, 29.00c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.80c; New York, del., 3.02c; Phila., del., 2.954c; Geneva, Utah (base, del.), 2.975c; Los Angeles (base, del.), 3.41c-3.47c for sizes produced at Torrance, Calif., beyond sizes at Geneva; Los Angeles and San Francisco, del., 3.52c for sizes produced at Geneva; San Francisco, del., 3.41c for sizes produced at Fontana, Calif.

Alloy Structural Shapes: Pittsburgh, Chicago, 3.55c.

Steel Piling: Pittsburgh, Chicago, Buffalo, $3.30 per 100 lb.

Wire and Wire Products

(Fob Pittsburgh, Chicago, Cleveland and Birmingham per 100 pounds).

Wire to Manufacturers in carloads

Bright, basic or bessemer	*$3.55-3.80
Spring (except Birmingham)	**$4.25-**4.50

Wire Products to Trade

Nails	
Standard and cement-coated	†$4.25
Galvanized	‡$4.00
Staples, polished and galvanized	$4.25
Wire, Merchant Quality	
Annealed (6 to 8 base)	§$4.20
Galvanized (6 to 8 base)	§$4.65
(Fob Pittsburgh, Chicago, Birmingham, per base column)	
Woven fence, 15 gage and heavier	††91
Barbed wire, 80-rod spool	††101
Barbless wire, twisted	101
Fence Posts (no clamps)	††90
Bale ties, single loop	††91

* Worcester, $3.65, Duluth, $3.60, base. San Francisco (base, del.), $4.56, bright basic only.

** Worcester $4.60, Duluth and Trenton, N. J., $4.75, base. San Francisco (base, del.) $5.63 for MB spring wire; $5.28 black premier.

† Worcester $4.55, Cleveland $4.35, base. San Francisco (base, del.) $5.33.

‡ Duluth $4.00, Cleveland $4.10, base. San Francisco (base, del.) $5.08.

§ Worcester $4.30, annealed; $4.75, galvanized. Duluth $4.20, annealed; $4.65, galvanized. San Francisco (base, del.) $5.21, annealed; $5.66, galvanized.

†† San Francisco (base, del.): Woven fence, 114; barbed wire, 121; bale ties, 115. Duluth (base): Woven fence, 91; barbed wire, 101; fence posts 90.

Rails, Supplies

Rails: Standard, over 60-lb fob mill, $2.75 per 100 lb. Light rails (billet), Pittsburgh, Birmingham, $3.10 per 100 lb; light rails (rail steel), Williamsport, Pa., Pittsburgh prices upon application.

Relaying, 60 lb and over fob warehouse $55-$56 per net ton.

Supplies: Track bolts, 7.00c; heat treated, 7.25c. Tie plates, $3.05 per 100 lb, fob mill; $3.40 base, Seattle; $3.20, base, Pittsburg, Calif. Splice bars, $3.25 per 100 lb, fob mill. Standard spikes, 4.85c; screw spikes, 6.75c. Axles, 4.10c.

Tubular Goods

Standard Steel Pipe: Base price in carlots, threaded and coupled, to consumers about $200 a net ton. Base discounts Pittsburgh on all types; Lorain on steel butt weld, and seamless; Gary, Ind., 2 points less on steel lap weld and 1 point less on steel butt weld on sizes produced in that district.

	Butt Weld				
In	Blk.	Gal.	In	Blk.	Gal.
⅛	46	19½	1	56	41½
¼	47	25	1¼	56½	42
⅜	44	22	1½	57	42½
½	50½	34½	2	57½	43
¾	53½	38½	2½ & 3	58	43½

	Lap Weld		Elec. Weld		Seamless	
In.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
2	49	34	48½	33½	48	33
2½-3	52	37	51½	36½	51	36
3½-6	54	39	53½	38½	53	38

Line Steel Pipe: Base price in carlots to consumers about $200 a net ton. Base discounts Pittsburgh and Lorain, O.

In.	Butt Weld	In.	Butt Weld
⅛	45	1	55
¼	46	1¼	55½
⅜	43	1½	56
½	49½	2	56½
¾	52½	2½ & 3	57

In.	Lap Weld	Elec. Weld	Seamless
2	48	47½	47
2½ & 3	51	50½	50
3½-6	53	52½	52
8	53½	53	52½
10	53	52½	52
12	52	51½	51

Boiler Tubes: Net base prices per 100 ft, fob Pittsburgh, in carload lots, minimum wall thickness, cut lengths 4 to 24 feet, inclusive.

		——Seamless——		—Elec. Weld—	
O.D.		Hot	Cold	Hot	Cold
Sizes	B.W.G.	Rolled	Drawn	Rolled	Drawn
1″	13	....	$11.87	$11.51	$11.51
1¼″	13	....	14.06	11.48	13.64
1½″	13	$13.08	15.69	12.69	15.22
1¾″	13	14.88	17.85	14.43	17.31
2″	13	16.67	19.99	16.17	19.39
2¼″	13	18.58	22.29	18.02	21.62
2¼″	12	20.47	24.54	19.86	23.80
2½″	12	22.42	26.87	21.75	26.06
2¾″	12	23.76	28.48	23.05	27.63
3″	12	24.93	29.90	24.18	29.00
3¼″	11	29.03	34.81	28.16	33.77
3½″	11	31.17	37.39	30.23	36.27
4″	10	38.69	46.38	37.53	44.99
4½″	9	51.28	61.50	....	....
5″	9	59.39	71.18	....	....
6″	7	91.13	109.27	....	....

Pipe, Cast Iron: Class B, 6-in. and over $74.50 per net ton, Birmingham; $79.50, Burlington, N. J.; $86.12, del. Chicago; 4-in. pipe, $5 higher; class A pipe, $5 a ton over Class B.

Bolts, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chicago; add 15c per cwt, Lebanon, Pa. Additional discounts: 5 for carloads; 15 for full containers, except tire, step and plow bolts.

Carriage and Machine Bolts

½-in. and smaller; up to 6 in. in length	45 off
⅝ and ⅞ x 6-in. and shorter	46 off
¾-in. and larger x 6-in. and shorter	43 off
All diameters longer than 6-in.	41 off
Tire bolts	35 off
Step bolts	43 off
Plow bolts	54 off
Lag bolts	
All diameters 6 in. and shorter	46 off
All diameters longer than 6 in.	44 off

Stove Bolts

In packages, nuts separate, 65-10 off; bulk 75 off on 15,000 of 3-in. and shorter, or 5000 over 3-in., nuts separate.

Nuts

Semifinished hexagon	A.S. Light	A.S. Reg. and Heavy
7/16-in. and smaller	46 off	.....
½-in. and smaller	.....	44 off
½-in.-1-in.	44 off	.....
⅝-in.-1-in.	.....	43 off
1⅛-in.-1½-in.	42 off	41 off
1⅝-in. and larger	.....	35 off

Additional discount of 15 for full containers.

Hexagon Cap Screws (Packaged)

Upset 1-in. smaller by 6-in. and shorter (1020 bright)	53 off
Upset (1035 heat treated)	
⅝ and smaller x 6 and shorter	48 off
¾, ⅞, & 1 x 6 and shorter	44 off

Square Head Set Screws

Upset 1-in. and smaller	57 off
Headless, ¼-in. and larger	40 off
No. 10 and smaller	52 off

Rivets

Fob Pittsburgh, Cleveland, Chicago, Birmingham

Structural ½-in. and larger	5.65c
Lebanon, Pa.	5.80c
7/16-in. and under	55 off
Lebanon, Pa.	55 off plus 15c per cwt.

Washers, Wrought

Fob Pittsburgh, Chicago, Philadelphia, to jobbers and large nut and bolt manufacturers, lcl ..... $1-$2 off

Tool Steels

Tool Steel: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb; reg. carbon 16.00-17.00c; extra carbon 20.00c; special carbon 24.00c; oil-hardening 26.00c; high carbon-chromium 47.00c.

W	Cr	V	Mo	Base, Per lb
18.00	4	1	...	82.00c
1.5	4	1	8.5	59.00c
12	3	0.50	...	67.00c
6.40	4.15	1.90	5	63.00c
5.50	4.50	4	4.50	80.00c

Stainless Steels

Base, Cents per lb

Grade	Bars, Drawn Wire, Structurals	Plate	Sheets	Hot Rolled Strip	Cold Rolled Strip
CHROMIUM NICKEL STEELS					
301	26.00c	29.50c	37.00c	22.00c	28.00c
302	26.00	29.50	37.00	23.50	30.50
303	28.50	31.50	39.00	29.50	36.00
304	27.50	31.50	39.00	25.50	32.50
308	31.50	37.00	44.50	31.00	38.00
309	39.00	43.50	51.00	40.50	51.00
310	53.50	56.50	57.50	53.00	61.00
316	43.50	48.00	52.00	43.50	52.00
321	31.50	37.00	44.50	32.00	41.50
347	36.00	41.50	49.00	36.00	45.50
431	21.00	24.00	31.50	19.00	24.50
440A	26.00	31.00	36.50	26.00	30.50
STRAIGHT CHROMIUM STEEL					
403	23.50	27.00	32.00	23.00	29.50
410	20.50	23.50	29.00	18.50	24.00
416	21.00	24.00	29.50	20.00	25.50
420	26.00	31.00	36.50	26.00	39.50
430	21.00	24.00	31.50	19.00	24.50
430F	21.50	24.50	32.00	20.50	27.00
442	24.50	28.00	35.50	26.00	35.00
443	24.50	28.00	35.50	26.00	35.00
446	30.00	33.00	39.50	38.00	56.50
*501	9.00	13.00	17.50	13.00	18.50
*502	10.00	14.50	18.50	14.50	19.50
†STAINLESS CLAD STEEL (20%)					
304	....	24.00	22.00	....	....
410	....	22.00	20.00	....	....
430	....	22.50	20.50	....	....
446	....	29.00	27.00	....	....

* Low chromium. † Fob Pittsburgh and Washington, Pa.; plate prices include annealing and pickling.

RAW MATERIAL AND FUEL PRICES

Minimum delivered prices do not include 3 per cent federal tax.

Pig Iron

Per Gross Ton	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem, Pa., base	$37.00	$37.50	$38.00	$38.50
Newark, N. J., del.	39.02	39.52	40.02	40.52
Brooklyn, N. Y., del.	....	40.80	44.30	....
Philadelphia, del.	38.84	39.34	39.84	40.34
Birdsboro, Pa., base	40.00	40.50	41.00	41.50
Birmingham, base	32.88*	33.38*	....	....
Baltimore, del.	....	40.42	....	....
Chicago, del.	....	36.72	....	....
Cincinnati, del.	....	38.74	....	....
Newark, N. J., del.	....	39.14	....	....
Philadelphia, del.	....	38.96	....	....
St. Louis, del.	....	37.77	....	....
Buffalo, base	36.00*	36.00*	36.50*	37.00
Boston, del.	43.13	43.13	43.63	44.13
Rochester, del.	38.02	38.02	38.52	39.02
Syracuse, del.	38.75	38.75	39.25	39.75
Canton, Massillon, O., base	35.50	36.00	36.50	....
Chicago, base	35.50	36.00	36.50	37.00
Milwaukee, del.	36.95	37.45	37.95	38.45
Muskegon, Mich., del.	....	40.21	40.71	....
Cleveland, fob furnace	35.50*	36.00*	36.50*	37.00
Akron, del.	37.34	37.84	38.34	38.84
Duluth, base	36.00	36.50	37.00	37.50
Erie, Pa., base	35.50	36.00	36.50	37.00
Everett, Mass., base	....	45.00	45.50	....
Granite City, Ill., base	36.50	37.00	....	....
St. Louis, del.	37.33	37.83	....	....
†**Neville Island, Pa., base**	36.00	36.50	36.50	37.00
Pittsburgh, del., N.&S. Sides	36.913	37.413	37.413	37.913
Provo, Utah, base	36.00	36.50	....	....
Seattle, Tacoma, Wash., del.	....	43.03	....	....
Portland, Oreg., del.	....	43.03	....	....
Sharpsville, Pa., base	36.00	36.50	36.50	37.00
Steelton, Pa., base	37.00	37.50	38.00	38.50
Struthers, O., base	36.50	37.00	37.00	37.50
Swedeland, Pa., base	41.00	41.50	42.00	42.50
Troy, N. Y., fob furnace	39.50	....	40.00	....
Toledo, O., base	35.50	36.00	36.50	37.00
Cincinnati, del.	39.35	39.85	....	....
Youngstown, O., base	36.00	36.50	36.50	37.00
Mansfield, O., del.	39.28	39.78	39.78	40.28

† To Neville Island base add: 72.6c for McKees Rocks, Pa., $1.111 Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa; $1.463 Oakmont, Verona; $1.639 Brackenridge.

* Republic Steel Corp., quotes $3 a ton higher at Birmingham, effective Aug. 13; $2.00 higher for No. 2 foundry and malleable and $1.50 higher for basic at Buffalo and $6.75 higher at Cleveland, effective on shipments during week ended Nov. 2.

Blast Furnace Silvery Pig Iron

6.00-6.50 per cent (base)	**$45.50**		
6.51-7.00	46.75	9.01- 9.50	53.00
7.01-7.50	48.00	9.51-10.00	54.25
7.51-8.00	49.25	10.01-10.50	55.50
8.01-8.50	50.50	10.51-11.00	56.75
8.51-9.00	51.75	11.01-11.50	58.00

Fob Jackson, O., per gross ton; Buffalo base $1.25 higher. Buyer may use whichever base is more favorable.

Bessemer Ferrosilicon

Prices same as for blast furnace silvery iron, plus $1 per gross ton.

Electric Furnace Silvery Pig Iron: Si 14.01-14.50%, $70.75, Jackson, O.; $73.75, Niagara Falls; $73, open-hearth and foundry grade, Keokuk, Iowa. Add $1 a ton for each additional 0.5% Si to 18%; 50c for each 0.5% Mn over 1%; $1 a ton for 0.045% max. phos.

Charcoal Pig Iron

Semi-cold blast, low phosphorus. Fob furnace, Lyles, Tenn....$50.00

(For higher silicon irons a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $36.00

Low Phosphorus

Steelton, Pa., Buffalo, Troy, N. Y., $42.00; Birdsboro, Pa., $45 base; Philadelphia, $44.38, del. Intermediate phosphorus, Central furnace, Cleveland, $39.00.

Differentials

Basing point prices are subject to following differentials:

Silicon: An additional charge of 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

Manganese: An additional charge of 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Metallurgical Coke

Price per Net Ton

Beehive Ovens

Connellsville, furnace	$12.00-$12.50
Connellsville, foundry	14.00- 15.00
New River, foundry	12.50
Wise county, foundry	11.15
Wise county, furnace	10.65

Oven Foundry Coke

Kearney, N. J., ovens	$17.85
Chicago, outside del.	17.60
Chicago, del.	18.60
Terre Haute, del.	18.15
Milwaukee, ovens	18.25
New England, del.	19.60
Birmingham, del.	15.10
Indianapolis, ovens	17.00
Cincinnati, del.	16.60
Ironton, O., ovens	15.50
Painesville, ovens	16.60
Cleveland, del.	18.00
Buffalo, del.	18.75
Detroit, del.	17.75
Philadelphia, ovens	16.90
Swedeland, Pa., ovens	16.90
Portsmouth, O., ovens	16.00
Fairmont, W. Va., ovens	15.75
Pittsburgh, del.	17.71

Coal Chemicals

Spot, gal. freight allowed east of Omaha. Effective as of Apr. 1, 1947.

Pure and 90% benzol	19.00c
Toluol, two degrees	23.00c
Industrial xylol	23.00c
Solvent naphtha	26.00c

Per pound fob works

Phenol (car lots, returnable drums)	11.25c
Do., less than carlots	12.00c
Do., tank cars	10.25c

Eastern plants, per pound

Naphthalene flakes, balls, bbl, to jobbers, "house-hold use"	9.50c

Per ton, bulk, fob plants

Sulphate of ammonia	$30.00

Refractories

Per 1000, fob shipping point

Net Prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky.	$87.00

High Heat Duty

Pa., Ill., Md., Mo., Ky.	70.00
Ala., Ga.	70.00
N. J.	75.00

Intermediate Heat Duty

Ohio	64.00
Pa., Ill., Md., Mo., Ky.	64.00
Ala., Ga.	56.00
N. J.	67.00

Low-Heat Duty

Pa., Md., Ohio	56.00

Ladle Brick

(Pa., O., Va., Mo.)

Dry Press	47.00
Wire Cut	45.00

Malleable Bung Brick

All bases	80.00

Silica Brick

Pennsylvania	70.00
Joliet, E. Chicago	79.00
Birmingham, Ala.	70.00

Basic Brick

Net tons, fob Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	59.00
Chem. bonded chrome	59.00
Magnesite brick	81.00
Chem. bonded magnesite	70.00

Magnesite

Domestic dead-burned grains, net ton, fob Chewelah, Wash.

Bulk	24.00
Single bags	28.00

Dolomite

Domestic, dead-burned, bulk, net ton, fob Billmeyer, Blue Bell or Williams, Pa., Millville, W. Va., Nario, Millersville, Martin, Gibsonburg or Woodville, O., $11.05; Midwest (fob Thornton or McCook, Ill.), add $0.10; Missouri Valley (fob Dolly Siding, and Bonne Terre, Mo.), add $0.20.

ORES

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer	$5.95
Old range nonbessemer	5.80
Mesabi bessemer	5.70
Mesabi nonbessemer	5.50
High phosphorus	5.55

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56.63% contract	15.25

Foreign Ore

Cents per unit, cif Atlantic ports

No. African low phos.	Nom.
Swedish basic, 60 to 68%	13.50
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% fob Rio de Janeiro, nom.	5.50-6.50

Tungsten Ore

Wolframite and scheelite per short ton unit, duty paid	$30-$32

Manganese Ore

46.50%, duty paid, fob cars, New York, Philadelphia, Baltimore, Norfolk, Va., Mobile, Ala., New Orleans, 67.00c-69.00c.

Chrome Ore

Gross ton fob cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Oreg., or Tacoma, Wash.

(S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	$37.50
48% 3:1	39.00
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	$27-$27.50
45% no ratio	28.00
48% no ratio	30.00
50% no ratio	31.00
Brazilian—nominal	
44% to 2.5:1 lump	$33.65
48% 3:1 lump	43.50
Rhodesian	
45% no ratio	$27-$27.50
48% no ratio	30.00
48% 3:1 lump	39.00
Domestic (seller's nearest rail)	
48% 3:1	$39.00

Molybdenum

Sulphide conc., lb., Mo. cont., Mines	$0.75

Fluorspar

Metallurgical grade, fob shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70% or more, $33; 65% to 70%, $32; 60% to 65%, $31; less than 60%, $30.

HIGH-STRENGTH—LOW-ALLOY STEELS

Prices in dollars per 100 pounds

	Pittsburgh	Chicago	Gary	Youngstown	Sparrows Point	Buffalo	Bethlehem	Canton	Massillon
Sheets, Hot-Rolled	4.30	4.30	4.30	4.30	4.30	4.30	...	...	...
Cold-Rolled	5.30	5.30	5.30	5.30	...	5.30	...	...	...
Galvanized	5.85	...	...	...	...	...	...	...	...
Strip, Hot-Rolled	4.30	4.30	4.30	4.30	...	...	...	...	...
Cold-Rolled	5.30	5.30*	5.30*	5.30	...	...	...	...	...
Shapes, Structural	4.30	4.30	...	4.30	...	...	4.30	...	...
Plates	4.55	4.55	4.55	...	4.55	...	...	...	...
Bars, Small Shapes	4.45	4.45	4.45	4.45	...	4.45	...	4.45	4.45

* Nax High Tensile, produced by Great Lakes Steel Corp., quoted 10 cents higher

WAREHOUSE STEEL PRICES

Prices, cents per pound, for delivery within switching limits, subject to extras.

	SHEETS					STRIP		BARS				PLATES	
	H-R 10G	C-R 10G	C-R 17G	Gal. *10G	Gal. *24G	†H-R	†C-R	H-R Rds. ⅝" to 3"	C-F Rds. ½"& up	H-R Alloy (8)4140)	Structural Shapes	Carbon ⅜"-¾"	Floor ⅝" & Thicker
Boston (city)	4.96	6.03[4]	5.73[4]	6.16[4]	7.41[4]	5.04	6.73	4.95	5.63	7.22	4.82	5.11	6.79
††New York (city)	4.91	6.12	5.82[8]	6.11	7.36	5.03	....	5.02	5.57	7.00[9]	4.75	5.06	6.76
New York (country)	4.76	5.97	5.67[8]	5.96	7.21	4.88	....	4.87	....	....	4.60	4.91	6.61
Philadelphia (city)	4.67	6.28	5.88	5.87	7.12	4.78	5.68	4.83	5.53	6.95[9]	4.55	4.82	6.31
Philadelphia (country)	4.57	6.18	5.78	....	....	4.68	5.58	4.73	....	6.85[9]	4.45	4.72	6.21
Baltimore (city)	4.29†	5.85	5.55	5.54	6.79	4.70	....	4.75	5.45	....	4.64	4.74	6.20
Baltimore (country)	4.19†	5.75	5.45	5.35	6.60	4.60	....	4.65	....	....	4.54	4.64	6.10
Washington (city)	4.75	....	....	....	....	4.95	....	5.00	5.60[13]	....	4.90	4.95	6.60
Washington (country)	4.65	....	....	....	....	4.85	....	4.90	....	....	4.80	4.85	6.50
Norfolk, Va.	4.80	....	....	....	....	....	....	5.10	5.90	....	5.05	5.05	6.80
Memphis, Tenn. (city)	4.82[20]§§	5.87[20]†	....	6.37	....	5.02[20]	....	4.97[20]	5.87	....	4.97[20]	5.17[20]	6.87[20]
Memphis, Tenn. (country)	4.72[20]§§	5.77[20]†	....	6.27	....	4.92[20]	....	4.87[20]	5.77	....	4.87[20]	5.07[20]	6.77[20]
Buffalo (city)	4.45	....	5.20[8]	6.00	....	4.70	5.65	4.40	5.10	6.65	4.40	4.95	6.20
Buffalo (country)	4.30	....	5.05[8]	5.55	....	4.25	5.50	4.25	4.95	6.65	4.25	4.45	5.75
Pittsburgh (city)	4.25§§	....	5.10[8]†	5.65	6.90	4.35	5.35	4.40	5.10	6.65	4.40	4.60	5.90
Pittsburgh (country)	4.15§§	....	4.90[8]†	5.50	6.75	4.20	5.20	4.25	4.95	6.65	4.25	4.45	5.75
Cleveland (city)	4.45	5.50[8]	5.20[8]	5.79	7.04	4.52	5.35	4.40	5.10	6.93	4.65	4.60	6.15
Cleveland (country)	4.30	5.35[8]	5.05[8]	....	....	....	5.20	4.25	4.95	....	....	4.40	....
Cincinnati (city)	4.671	5.516[8]	....	5.716	6.466	4.694	....	4.703	5.353	....	4.744	4.903	6.244
Detroit	4.55	....	5.30	....	....	4.72	5.63	4.50	5.22	7.10	4.77	4.88	6.28
Indianapolis	4.55	5.32[8]	....	5.87	7.12	4.65	5.90	4.70‡‡	5.40	8.85	4.70	4.90	6.35
Chicago (city)	4.45	5.50[8]	5.20[8]	5.65	6.90	4.35	5.45	4.40	5.10	6.65[9]	4.40	4.60	6.05
Chicago (country)	4.30	5.35[8]	5.05[8]	5.50	6.75	4.20	5.30	4.25	4.95	6.65[9]	4.25	4.45	5.90
Milwaukee	4.629	5.679[8]	5.379[8]	5.829	7.079	4.529	5.629	4.579	5.279	6.979[9]	4.579	4.779	6.229
St. Louis	4.749	5.799[9]	5.499[8]	5.974	7.224	4.649	5.774	4.699	5.424[12]	7.124	4.699	4.899	6.349
Birmingham (city)	4.45[20]§§	....	....	5.65	....	4.45[20]	....	4.40[20]	5.93[23]	....	4.40	4.65	6.86
Birmingham (country)	4.30[20]§§	....	....	5.50	....	4.30[20]	....	4.25[20]	....	....	4.25	4.50	....
New Orleans	4.98[20]**	....	6.29[18]	....	....	5.18[20]	....	5.13[20]**	6.29[11]	....	5.03[20]**	5.33[20]	7.29[20]
Omaha, Nebr.	5.365	....	....	6.565	7.815	5.265	....	5.315	6.015	....	5.315	5.515	6.965
San Francisco	5.20[21]	6.65[8]	....	6.85[8]	7.75[8]	5.75[21]	8.70[15]	5.05[21]	7.00[12]	9.35	5.20[21]	5.30[21]	7.10[21]
Seattle, Tacoma, Wash.	5.30[17]§§	....	7.10[8]‡	6.70	....	5.60[17]	....	5.45[17]	7.45[19]	8.50[13]	5.25[17]	5.45[17]	7.55[17]
Portland, Oreg.	5.30[17]§§	....	7.10[8]‡	6.70	....	5.60[17]	....	5.45[17]	7.45[19]	....	5.25[17]	5.45[17]	7.55[17]

Base Quantities: 400 to 1999 lb except as noted: Cold-rolled strip, 2000 lb and over, cold finished bars, 1000 lb and over; galvanized sheets, 450 to 1499 lb; [1]—any quantity; [2]—300 to 1999 lb; [3]—150 to 2249 lb; [4]—three to 24 bundles; [5]—450 to 1499 lb; [6]—one bundle to 1499 lb; [7]—one to nine bundles; [8]—400 to 1499 lb; [9]—1000 to 1999 lb; [10]—450 to 39,999 lb; [11]—1000 to 39,999 lb; [12]—1000 lb and over; [13]—400 to 14,999 lb; [14]—400 to 39,999; [15]—2000 lb and over; [16]—1000 to 4999 lb; [17]—300 to 9999 lb; [18]—1500 to 1999 lb; [19]—1500 to 39,999 lb; [20]—400 to 3999 lb; [21]—400 lb and over; [22]—500 to 1499 lb.

* Include gage and coating extra, except Birmingham (coating extra excluded); † does not include gage extras; ‡ 15 gage; § as rolled; ** add 0.40 for sizes not rolled in Birmingham; †† same prices quoted for Jersey City, N. J.; ‡‡ add 15c for 100 lb for slow moving items; §§ 18 gage and heavier.

PRICES OF LEADING FERROALLOYS PRODUCTS

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si.) Carlot per gross ton, $47, Palmerton, Pa., $51, Pittsburgh. 16% to 19% Mn., $46, Palmerton, $50, Pittsburgh.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.). Carload, lump, bulk $145 per gross ton of alloy, carload packed $153, ton lot $165, less ton $172; fob New Orleans, Mobile, Philadelphia, Baltimore, or New York. Carload, lump, bulk $151, fob cars Pittsburgh, including 50c switching charge. Add, or subtract, $1.80 for each 1%, or fraction thereof, of contained manganese over 82% or under 78%. **West Coast Prices:** Carload (80,000 lb or more), lump, bulk, same price and basing points as above. All other prices for shipment from Pacific Coast warehouses, add $26.21 to above prices. Delivery is fob Portland, Los Angeles, South San Francisco, or Seattle warehouses, with railroad freight allowed on shipments of 25 gross tons or more.

Low-Carbon Ferromanganese, Regular Grade: (Mn 80-85%). Eastern Zone, carload, lump, bulk, max. 0.10% C, 22.5c per lb of contained Mn, carload packed 23c, ton lot 23.6c, less ton 24.2c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.7c for c.l. and 4.4c for l.c.l. Freight allowed. Deduct 0.5c for max 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 0.75% C—max. 7% Si. **Special Grade:** (Mn 90% approx., C 0.07% max., P 0.06% max.). Add, 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max., Si 1.5% max.). Eastern Zone, carload, lump, bulk 16.5c per lb of contained Mn, carload packed 17c, ton lot 17.6c, less ton 18.2c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.7c for c.l. and 4.4c for l.c.l. Freight allowed. Spot, add 0.25c.

Manganese Metal: (Mn 96% min., Fe 2% max., Si 1% max., C 0.20% max.). Eastern Zone, carload, 2" x D, bulk 32c per lb of metal, carload packed 32.5c, ton lot 34c, less ton 36c; Central, add 1c for c.l. and 1.45c for l.c.l.; Western, add 1.45c for c.l. and 2.4c for l.c.l. Freight allowed. Spot, add 2c.

Silicomanganese: (Mn 65-70%). Eastern Zone, contract, lump, bulk, 1.50% C grade, 17-20% Si, 7.4c per lb of alloy, carload packed, 7.95c, ton lot 8.45c, less ton 8.95c; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.8c for c.l. and 2.5c for l.c.l. Freight allowed. For 2.0% C grade, Si 15-17%, deduct 0.2c from above prices. Spot, add 0.25c.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Eastern Zone, contract, c.l., lump, bulk 17.6c per lb of contained Cr, c.l., packed 18.2c, ton lot 18.8c, less ton 19.5c; Central, add 0.4c for c.l. and 1.3c for l.c.l.; Western, add 0.55c for c.l. and 2.1c for l.c.l. Freight allowed. Spot, add 0.25c.

"SM" High-Carbon Ferrochrome: (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

Foundry Ferrochrome: (Cr 62-66%, C 5-7%). Eastern Zone, contract, c.l., SMxD, bulk 19.1c per lb of contained Cr, c.l., packed 19.7c, ton lot 20.4c, less ton 21.35c; Central, add 0.4c for c.l. and 1.3c for l.c.l.; Western, add 0.55c for c.l. and 2.1c for l.c.l. Freight allowed. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-72%). Eastern Zone, contract, carload, lump, bulk, max. 0.03% C 27c per lb of contained Cr, 0.04% C 26c, 0.05% C 25.5c, 0.06% C 25c, 0.10% C 24.5c, 0.15% C 24.0c, 0.20% C 23.75c, 0.50% C 23.5c, 1% C 23.0c, 2% C 22.5c. Carload packed add 0.8c, ton lot add 1.35c, less ton add 2.35c; Central, add 0.4c for c.l. and 0.65c for l.c.l.; Western, add 0.5c for c.l. and 1.85c for l.c.l. Freight allowed. Spot, add 0.25c.

"SM" Low-Carbon Ferrochrome: (Cr 62-66%, Si 4-6%, Mn 4-6%, and C 1.25% max.). Eastern Zone, contract, carload, lump, bulk 23c per lb of contained chromium, carload, packed 23.8c, ton lot 24.35c, less ton 25.35c; Central, add 0.4c for c.l. and 0.65c for l.c.l.; Western, add 0.5c for c.l. and 1.85c for l.c.l. Freight allowed. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 2c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. Add 2c for each 0.25% of N above 0.75%.

Chromium Metal: (Min. 97% Cr and 1% Fe.). Eastern Zone, contract, carload, 1" x D, bulk, max. 0.50% C grade, 87c per lb of contained chromium, carload packed 88c, ton lot 89.5c, less ton 91.5c; Central, add 1.5c for c.l. and 2.5c for l.c.l.; Western, add 2.75c for c.l. and 4.5c for l.c.l. Freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk 8.8c per lb of contained Si, carload packed 10c, ton lot 10.65c, less ton 11.3c; Central, add 0.5c for c.l. and 1.25c for l.c.l.; Western, add 0.7c for c.l. and 1.8c for l.c.l. Freight allowed. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.). Add 1.3c to 50% Ferrosilicon prices.

75% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk 11.2c per lb of contained Si, carload packed 12.25c, ton lot 12.85c, less ton 13.45c; Central, add 0.3c for c.l. and 0.75c for l.c.l.; Western, add 1.05c for c.l. and 5c for l.c.l. Freight allowed. Spot, add 0.3c.

85% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk 12.7c per lb of contained Si, carload packed 13.7c, ton lot 14.25c, less ton 14.8c; Central, add 0.3c for c.l. and 0.7c for l.c.l.; Western, add 1.05c for c.l. and 4.4c for l.c.l. Freight allowed. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.). Add 0.7c to 85% Ferrosilicon prices.

90-95% Ferrosilicon: Eastern Zone, contract, carload, lump, bulk, 14.35c per lb of contained Si, carload packed 15.35c, ton lot 15.85c, less ton 16.35c; Central, add 0.3c for c.l. and 0.65c for l.c.l.; Western, add 1c for c.l. and 4c for l.c.l. Freight allowed. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.). Add 0.65c to above 90-95% Ferrosilicon prices.

Silicon Metal: (Over 97% Si and 1% max. Fe). Eastern Zone, c.l., lump, bulk, regular, 16.5c per lb of Si, c.l. packed 17.5c, ton lot 18c, less ton 18.5c; Central, add 0.6c for c.l. and 2.25c for l.c.l.; Western, add 1.2c for c.l. and 4c for l.c.l. Add 1c for max. 0.20% calcium grade. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade, analyzing over 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract basis fob Niagara Falls, N. Y., lump per lb c.l. 6.50c; ton lots packed, 7c; 200 to 1999 lb, 7.75c; smaller lots, 8.25c. Spot up 0.5c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3½ lb each and containing exactly 2 lb of Cr). Eastern Zone, contract, carload, bulk, 11.1c per lb of briquet, carload packed 11.6c, ton lot 12c, less ton 12.4c; Central, add 0.25c for c.l. and 0.9c for l.c.l.; Western, add 0.35c for c.l. and 1.5c for l.c.l. Freight allowed. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 2 lb and containing exactly 2 lb of Mn). Eastern Zone, contract, carload, bulk, 8c per lb of briquet, c.l. packed, 8.6c, ton lot 9c, less ton 9.4c; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.8c for c.l. and 2.5c for l.c.l. Freight allowed. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Eastern Zone, contract, c.l., bulk 7.65c per lb of briquet, c.l. packed 8.25c, ton lot 8.65c, less ton 9.05c; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.8c for c.l. and 2.5c for l.c.l., freight allowed. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (**Large size**—weighing approx. 5 lb and containing exactly 2 lb of Si). Eastern Zone, contract, carload, bulk 4.65c per lb of briquet, c.l. packed 5.25c, ton lot 5.65c, less ton 6.05c. (**Small size**—weighing approx. 2½ lb and containing exactly 1 lb of Si). Eastern Zone, carload, bulk 4.8c, c.l. packed 5.4c, ton lot 5.8c, less ton 6.2c; Central, add 0.25c for c.l. and 0.6c for l.c.l.; Western, add 0.45c for c.l. and 0.9c for l.c.l. Freight allowed. Add 0.25c for notching, small size only. Spot, add 0.25c.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18%, and Si 53-59%). Eastern Zone, contract, carload, lump, bulk 16.75c per lb of alloy, carload packed 17.35c, ton lot 18.85c, less ton 19.85c; Central, add 0.5c for c.l. and 0.85c for l.c.l.; Western, add 2.55c for c.l. and 2.6c for l.c.l. Freight allowed. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Eastern Zone, contract, carload, lump, bulk 15.5c per lb of alloy, carload packed 16.5c, ton lot 18c, less ton 19c; Central, add 0.5c for c.l. and 0.75c for l.c.l.; Western, add 2.55c for c.l. and 2.90c for l.c.l. Freight allowed. Spot, add 0.25c.

VANADIUM ALLOYS

Ferrovanadium: Open Hearth Grade (Va 50-55%, Si 8% max., C 3% max.). Eastern Zone, contract, any quantity, $2.90 per lb of contained Va; Central, add 2c for c.l. and 3c for l.c.l.; Western, add 6c for c.l. and 9c for l.c.l. Freight allowed. Spot, add 10c. **Special Grade** (Va 50-55%, Si 4% max., C 1% max.), $3. **High Speed Grade** (Va 50-55%, Si 1.50% max., C .20% max.), $3.10.

Vanadium Oxide: All Zones, contract, less carload lots, $1.20 per lb of contained V_2O_5. Spot, add 5c.

Grainal: Vanadium Grainal No. 1, 87.5c; No. 6, 60c; No. 79, 45c; all fob Bridgeville, Pa., usual freight allowance.

TITANIUM ALLOYS

Ferrotitanium: (Ti 20-25%, Al 3% max., Si 4% max., C 0.10% max.). Eastern Zone, contract. ton lot, 2" x D, $1.35 per lb of contained Ti, less ton $1.40. (Ti 40-45%, Al 7% max., Si 4% max., C 0.10% max.). Ton lot $1.23, less ton $1.25; Central, add 4c for 20-25% Ti grade, and 2.1c for 40-45% grade; Western, add 13.5c for 20-25% Ti grade, and 7.2c for 40-45% grade. Freight allowed. Spot, add 5c.

Ferrotitanium, High-Carbon: (15-20%). Contract basis, per net ton, fob Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis, 6.8% C, $142.50; 3-5% C, $157.50.

TUNGSTEN ALLOYS

Ferrotungsten: (W 70-80%). Eastern Zone, contract, 10,000 lb W or more, $2.25 per lb of contained W; 2000 lb W to 10,000 lb W, $2.35; less than 2000 lb W, $2.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.). Eastern Zone, contract or spot, 1000 lb or more, $2.90 per lb of contained W; less than 1000 lb W, $3.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Eastern Zone, contract, c.l., lump, bulk 6c per lb of alloy, c.l. packed 6.55c, ton lot 6.9c, less ton 7.25c; Central, add 0.25c for c.l. and 1.1c for l.c.l.; Western, add 0.6c for c.l. and 3.95c for l.c.l. Freight allowed. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Eastern Zone, contract, carload, lump, packed 18.4c per lb of alloy, ton lot 19.15c, less ton 20.4c; Central, add 0.6c for c.l. and 1.05c for l.c.l.; Western, add 3.05c for c.l. and 4c for l.c.l. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Eastern Zone, contract, ton lots, 1" x D, $1.20 per lb of alloy, freight allowed. Less ton lots $1.30; Central, add 0.75c; Western, add 2.9c, freight allowed. Spot add 5c.

Borosil: (3 to 4% B, 40 to 45% Si). $6.25 per lb contained B, fob Philo, O., freight not exceeding St. Louis rate allowed.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 0.90 to 1.15%). Net ton to carload, 8c per lb, fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Mn 5% max., Si 8% max., C 0.5% max.). Eastern Zone, contract, ton lot, 2" x D, $2.50 per lb of contained Cb, less ton $2.55; Central, add 1.65c; Western, add 6.45c. Freight allowed. Spot, add 10c.

CMSZ Mixes: No. 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 0.75-1.25%, C 3.50-5%). Eastern Zone, carload, 12 M x D, bulk 15.75c per lb of material, carload packed 16.5c, ton lot 17.25c, less ton 18c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.3c for c.l. and 3.05c for l.c.l. Freight allowed.

Silcaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, Boron 0.55-0.75%). Eastern Zone, carload, packed, 1" x D, 37c per lb of alloy, ton lot 39c, less ton 41c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.3c for c.l. and 3.05c for l.c.l. Freight allowed.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Eastern Zone, contract, carload, packed, ½" x 12 M, 14.3c per lb of alloy, ton lot 15.05c, less ton 15.8c; Central, add 0.3c for c.l. and 1.1c for l.c.l.; Western, add 0.3c for c.l. and 3.05c for l.c.l. Freight allowed. Spot, add 0.25c.

Simanal: (Approx. 20% each Si, Mn, Al). Packed, lump, carload 9c, ton lots 9.25c, smaller lots 9.75c per lb alloy; freight not exceeding St. Louis rate allowed.

Ferrophosphorus: (17-19% based on 18% P content with unitage of $3 for each 1% of P above or below the base) Gross tons per carload fob sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferromolybdenum: (55-75%). Per lb, contained Mo, fob Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Red Metal Scrap and Silver Prices Rise

Ingot makers lift bids ½-cent to ¾-cent on several grades. Silver jumps to 73.25c

NEW YORK—United States and Canadian government officials opened a conference in Washington last week at which an effort will be made to obtain Canadian nickel and some other minerals for European reconstruction.

With the exception of red metal scrap and silver, which advanced rather sharply, major nonferrous metal prices held unchanged.

COPPER—A stronger price tone developed in copper scrap when ingot makers re-entered the market to replenish reserves only to find that some dealers are holding accumulations for higher prices. As a result, ingot makers raised their offering prices ½-cent to ¾-cent a pound on most grades. Ingot makers reported, however, that there has been no improvement in demand for ingots.

Consumption of copper increased about 12,000 tons in September to 108,413 tons compared with shipments by producers to fabricators of 95,582 tons in the month. The increase in consumption without a corresponding increase in receipts from the producers resulted in a decline of about 13,000 tons in the fabricators' stocks which totaled 426,423 tons at the end of September. Unfilled orders declined about 39,000 tons to a total of 386,678 tons, the lowest level reached since December, 1945. The deficit in the consumers' sales position was reduced by about 22,500 tons to a total of 156,227 tons, the smallest in two years.

The domestic market held unchanged last week at 21.50c, Connecticut, for electrolytic.

LEAD—Demand for November shipment of lead continued heavy last week and producers' quotas are practically filled. One large seller is completely sold and is awaiting the opening of December books before accepting any additional business. The market was firm at 14.80c to 14.85c, St. Louis.

ZINC—The government has under consideration several subsidy proposals whereby small metal mines would be kept in operation in order to build up strategic stockpiles, according to J. A. Krug, Secretary of the Interior. In the domestic market, demand for November shipment remained steady with all requirements met on the basis of 10.50c, East St. Louis, for prime western.

TIN—Malaya produced the equivalent of 3553 tons of fine tin in September, making a total of 23,241 tons for the first nine months of this year. Production for the full year is now estimated at about 35,000 tons, or an increase of 13,000 tons over the estimate made in April. The domestic market held steady last week on the basis of 80.00c, New York, for Straiits.

ALUMINUM—Average daily production of virgin aluminum in July held at 47,998 short tons compared with 46,259 tons in June, according to the Bureau of Mines. Sales totaled 43,837 tons compared with 36,419 tons in June, making total stocks at the end of July 78,054 tons compared with 73,893 tons at the end of June. Secondary markets were generally dull but near the end of the month demand for some varieties of scrap appeared slightly stronger.

Virgin aluminum was quoted unchanged at 15.00c for 30-pound ingots while secondary aluminum was quoted 13.75c for No. 12 alloy, No. 2 grade.

SILVER—Handy & Harman's official price, advanced sharply last week, closing at 73.25c per ounce, an advance of 1.875 cents for the week. Last week's upturn was the first fluctuation in the market since Sept. 23 and was attributed to re-entry of substantial buyers.

ANTIMONY—Very little activity has been noted in the antimony market recently with prices holding unchanged on the basis of 33.00c, fob Laredo, Tex., for 99½ per cent grade in bulk.

NONFERROUS METAL PRICES

Copper: Electrolytic, carlots 21.50c, delivered Conn.; Lake, 21.62½c del. Conn. Dealers may add ¾c for 5000 lb to carload; 1c 1000-4999 lb; 1½c, 500-999 lb; 2c 0-499 lb. Casting, nom., refinery, 20,000 lb or more; nom., less than 20,000 lb.

Brass Ingot: 85-5-5-5 (No. 115) 17.50c-18.00c; 88-10-2 (No. 215) 25.75-26.25c; 80-10-10 (No. 305) 21.50-22.00c; No. 1 yellow (No. 405) 13.75-14.50c; carlot prices, including 25c per 100 lb freight allowance; add ¼c for less than carloads.

Zinc: Prime western 10.50c, brass special 10.75c, intermediate 11.00c, E. St. Louis; high grade 11.50c, del., carlots. For 20,000 lb to carlots add 0.15c; 10,000-20,000 lb 0.25c; 2000-10,000 lb 0.4c; under 2000 lb 0.50c.

Lead: Common 14.80c-14.85c, chemical 14.90c, corroding 14.90c, E. St. Louis for carlots.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lb and over; add ½c 2000-9999 lb; 1c less through 2000 lb.

Secondary Aluminum: Piston alloy (No. 122 type) 14.00-14.50c; No. 12 foundry alloy (No. 2 grade) 13.75c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1 (95-97½%) 14.50c; grade 2 (92-95%) 12.75c; grade 3 (90-92%) 12.00-12.25c; grade 4 (85-90%) 11.50-11.75c. Above prices for 30,000 lb or more; add ¼c 10,000-30,000 lb; ½c 5000-10,000 lb; ¾c 1000-5000 lb; 1¼c less than 1000 lb. Prices include freight at carload rate up to 75c per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, about 20 lb), 10,000 lb and over, 20.50c; 2000 to 9999 lb, 21.50c; 100 to 1999 lb, 22.50c. Extruded rounds, 12 inches long, 1.312 inches in diameter, less than 25 lb, 52.00c-56.00c; 25 to 99 lb, 42.00c-46.00c; 100 to 4000 lb, 35.00c-36.00c.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lb, 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 80.00c; Grade B, 99.8% or higher, not meeting specifications for Grade A, with 0.05% max. arsenic, 79.85c; Grade C, 99.65-99.79% incl. 79.55c; Grade D, 99.50-99.64% incl., 79.40c; Grade E, 99-99.49% incl. 78.90c; Grade F, below 99% (for tin content), 78.70c.

Antimony: American bulk carlots fob Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 33.00c; 99.8% and over (arsenic, 0.05% max.; other impurities, 0.1% max.) 33.50c, effective as of Mar. 15. On producers' sales add ¼c for less than carload to 10,000 lb; ½c for 224-999 lb; add 2c for 223 lb and less; on sales by dealers, distributors, and jobbers add ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked 35.00c lb; 25 lb pigs produced from electrolytic cathodes 36.50c lb; shot produced from electrolytic cathodes 37.50c lb; "F" nickel shots or ingots for additions to cast iron 35.50c lb. Prices include import duty.

Mercury: Open market, spot, New York, $81-$84 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $17 per lb contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates rods, slabs, sticks, and all other "regular" straight or flat forms $1.75 lb, del.; anodes, balls, discs and all other special or patented shapes, $1.80.

Cobalt: 97-98%, $1.65 lb for 550 lb (keg) $1.67 lb for 100 lb (case); $1.72 lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Indium: 99.9%, $2.25 per troy ounce.

Silver: Open market, N. Y., 73.25c, per ounce.

Platinum: $62-$65 per ounce.

Palladium: $24 per troy ounce.

Iridium: $80-$90 per troy ounce.

Rolled, Drawn, Extruded Products

Copper and brass products prices based on 21.50c, Conn., for copper. Freight prepaid on 100 lb or more).

Sheet: Copper 33.68c; yellow brass 29.63c; commercial bronze, 95% 33.72c, 90% 33.11c, red brass, 85% 31.99c, 80% 31.38c; best quality 30.64c; Everdur, Duronze, Herculoy or equiv., cold-drawn, 38.46c; nickel silver, 18%, 42.49c; phosphor bronze, grade A, 5%, 52.00c.

Rods: Copper, hot rolled 30.03c, cold drawn 31.03c; yellow brass, free cutting, 24.39c; commercial bronze, 95% 33.41c, 90% 32.80c; red brass, 85% 31.68c, 80% 31.07c; best quality 30.33c.

Seamless Tubing: Copper 33.72c; yellow brass 32.39c; commercial bronze 90% 35.52c; red brass 85% 34.65c, 80% 34.04c; best quality brass 33.05c.

Wire: Yellow brass 29.92c; commercial bronze, 95% 34.01c, 90% 33.40c; red brass, 85% 32.28c, 80% 31.67c; best quality brass 30.93c. **Copper Wire:** Bare, soft, fob eastern mills, carlots 26.92c, less carlots 27.42c; weatherproof, fob eastern mills carlots 27.60c, less carlots 28.10c; magnet, delivered, carlots 29.75c-31.13c, 15,000 lb or more 30.00c-31.38c, less carlots 30.50c-31.88c.

Aluminum Sheets and Circles: 2s and 3s flats, mill finish, base 30,000 lb or more, fob shipping point. Actual transportation charges (not to exceed lowest carload rail freight rate) are deducted on orders for domestic delivery of 500 lb or more of one product to one destination. Widths from 12 in. and diameters from 9 in. to indicated maximum sizes. Prices, cents per lb, effective Jan. 30, 1947.

B. & S. Gage	Max. Width or Diam.	Sheet Base	Circle Base
0.0249"-7	48"	23.70	26.20
8-10	48"	24.20	26.70
11-12	26"	24.70	27.50
13-14	26"	24.90	27.90
15-16	26"	25.10	28.20
17-18	26"	25.40	28.60
19-20	24"	25.70	29.00
21-22	24"	26.10	29.50
23-24	24"	26.60	30.20
25	24"	27.10	30.90
26	24"	27.80	31.90
27	24"	28.50	33.00
28	24"	29.20	33.70
29	24"	30.00	34.70
30	24"	30.80	35.80

Lead Products: Prices to jobbers: Sheets, full rolls, 140 sq ft or more, 18.25c; add per hundredweight, 25c, 80 to 140 sq ft; 50c, 20 to 80 sq ft; 75c, 10 to 20 sq ft and circles. Pipe: Full coils 17.50c; cut coils 17.75c. Lead Traps and Bends: List plus 42%.

Zinc Products: Sheet, 15.50c, fob mill, 36,000 lb and over. Ribbon zinc in coils, 14.50c, fob mill, 36,000 lb and over. Plates, not over 12-in., 13.50c; over 12-in., 14.50c.

Plating Materials

Chromic Acid: 99.75%, flake, fob Philadelphia, carloads, 21.00c; 5 tons and over 21.50c; 1 to 5 tons, 22.00c; less than 1 ton, 22.50c.

Copper Anodes: Base, 2000 to 5000 lb; fob shipping point, freight allowed: Flat untrimmed, 30.59c; oval, 30.09c; electrodeposited, 29.84c; cast, 29.59c.

Copper Carbonate: 52-54% metallic Cu, 50 lb bags, 26.50c.

Copper Cyanide: 70-71% Cu, 100-lb drums, 45.00c fob Cleveland.

Sodium Cyanide: 96-98%, ½-oz ball, in 100 or 200 lb drums, 1 to 400 lb, 16.00c, 500 lb and over, 15.00c, fob Cleveland; 1 cent less, fob Niagara Falls.

Nickel Anodes: Rolled oval, carbonized, carloads, 48.00c; 10,000 to 30,000 lb, 49.00c; 3000 to 10,000 lb, 50.00c; 500 to 3000 lb, 51.00c; 100 to 500 lb, 53.00c; under 100 lb, 56.00c; add 1 cent for rolled depolarized.

Nickel Chloride: 100-lb kegs, 22.00c; 275-lb bbls, 20.00c.

Tin Anodes: Bar, 1000 lb and over 92.50c; 500 to 1000 lb, 93.00c; 200 to 500 lb, 93.50c; less than 200 lb, 95.00c; ball, 1000 lb and over, 94.75c; 500 to 1000 lb, 95.25c; 200 to 500 lb, 95.75c; less than 200 lb, 97.25c, fob Sewaren, N. J.

Tin Chloride: Fob Grasselli, N. J., 625 lb bbls., price on application.

Sodium Stannate: To all consumers: in 200 or 500 lb drums, 49.50c; 100 lb, 50.50c; 50 lb, 55.00c; 25 lb, 57.50c.
To consumers other than automobile, radio and refrigerator makers: 1500 lb, 45.85c; 600 to 1400 lb, 48.50c.
To automobile, radio and refrigerator makers: 10,000 lb and over, 44.50c; 2000 to 9999 lb, 45.50c; 1000 to 1999, 46.50c; 600 to 999 lb, 48.50c.

Zinc Cyanide: 100-lb drums 36.00c, fob Cleveland; 35.00c, fob Niagara Falls.

Scrap Metals

BRASS MILL ALLOWANCES

(Based on 21.50c, Conn., for copper)

Prices for less than 15,000 lb fob shipping point. Add ¾c for 15,000-40,000 lb; 1c for 40,000 or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	19.125	19.125	18.375
Yellow brass	15.125	14.875	14.250
Commercial Bronze			
95%	18.000	17.750	17.250
90%	17.500	17.250	16.750
Red brass			
85%	17.250	17.000	16.500
80%	16.875	16.625	16.125
Best Quality (71-79%)	16.125	15.875	15.375
Muntz Metal	14.125	13.875	13.375
Nickel silver, 5%	16.125	15.875	8.063
Phos. bronze, A, B	20.000	19.750	18.750
Naval brass	14.500	14.250	13.750
Manganese bronze	14.500	14.250	13.625

BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, fob shipping point, carload lots)

No. 1 copper 17.00, No. 2 copper 15.50-16.00, light copper 14.50-15.00, composition red brass 13.50, auto radiators 10.50, heavy yellow brass 10.00, brass pipe 10.25-10.50.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 18.00-18.25, No. 2 copper 16.50-16.75, light copper, 15.50-15.75, refinery brass (60% copper), per dry copper content less $5 smelting charge for brass analyzing 60 per cent or more, 12.625.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots or more)

Copper and Brass: Heavy copper and wire No. 1 16.00, No. 2 15.00, light copper 14.00, No. 1 composition red brass 11.00, No. 1 composition turnings 10.00-10.50, mixed brass turnings 5.50-6.00, new brass clippings nom. 10.50-11.00, No. 1 brass rod turnings 9.00-9.50, light brass 5.00-5.50, heavy yellow brass 6.00-6.50, new brass rod ends 9.00-9.50, auto radiators, unsweated 8.50-9.00, cocks and faucets 8.00-8.25, brass pipe 8.00-8.25.

Lead: Heavy 11.50, battery plates 6.25-6.50, linotype and stereotype 12.25-12.50, electrotype 10.75-11.00, mixed babbitt 10.75-11.00, solder joints 15.50-16.00.

Zinc: Old zinc 5.00, new die cast scrap 3.50, old die cast scrap 2.00-2.50.

Tin: No. 1 pewter 50.00-52.00, block tin pipe 67.00-68.00, auto babbitt 40.00-42.00, No. 1 babbitt 40.00-43.00, siphon tops 40.00-42.00.

Aluminum Clippings, 2S 8.00-8.50, old sheets 6.00-6.50, crankcases 6.00-6.50, borings and turnings 2.00-2.50, pistons, free of struts, 5.00-5.50.

Nickel: Anodes 16.00-17.00, turnings 12.50-13.00, rod ends 16.00-17.00.

Monel: Clippings 12.00-12.50, turnings 7.00-7.25, old sheets 10.00-10.50, rods 10.00-10.50, castings 9.00.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

PITTSBURGH

No. 1 Heavy Melt. Steel	$40.00
No. 2 Heavy Melt. Steel	40.00
No. 1 Busheling	40.00
Nos. 1, 2 and 3 Bundles	40.00
Machine Shop Turnings	34.50-35.00
Mixed Borings, Turnings	34.50-35.00
Short Shovel Turnings	36.00-37.00
Cast Iron Borings	35.00-36.00
Bar Crops and Plate	47.00-48.00
Low Phos. Steel	47.00-48.00
Elec. Furnace Bundles	47.00-48.00
Heavy Turnings	39.50-40.50

Cast Iron Grades

No. 1 Cupola	48.00-48.50
Charging Box Cast	43.00-44.00
Heavy Breakable Cast	39.00-40.00
Unstripped Motor Blocks	44.00-45.00
Malleable	54.50-55.00
Brake Shoes	39.00-40.00
Clean Auto Cast	49.00-50.00
No. 1 Wheels	48.50-49.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	42.50-43.00
R.R. Malleable	55.00-56.00
Axles	49.00-50.00
Rails, Rerolling	52.00-53.00
Rails, Random Lengths	49.00-49.50
Rails, 3 ft and under	50.00-51.00
Rails, 18 in. and under	52.00-53.00
Railroad Specialties	51.00-52.00
Uncut Tires	49.00-50.00
Angles, Splice Bars	50.00-51.00

CLEVELAND

No. 1 Heavy Melt. Steel	$40.75-43.00
No. 2 Heavy Melt. Steel	40.75-43.00
No. 1 Busheling	40.75-43.00
Nos. 1 & 2 Bundles	40.75-43.00
Machine Shop Turnings	33.00-33.50
Mixed Borings, Turnings	33.50-34.00
Short Shovel Turnings	33.50-34.00
Cast Iron Borings	33.50-34.00
Bar Crops and Plate	44.00-45.00
Punchings & Plate Scrap	44.00-45.00
Heavy Turnings	39.00-41.00
Alloy Free Turnings	37.00-39.00
Cut Structurals	47.00-48.00

Cast Iron Grades

No. 1 Cupola	50.00-52.00
Charging Box Cast	45.00-46.00
Stove Plate	48.00-48.50
Heavy Breakable Cast	45.00
Unstripped Motor Blocks	48.00-49.00
Malleable	60.00-62.00
Brake Shoes	44.00
Clean Auto Cast	52.00-52.50
No. 1 Wheels	48.00
Burnt Cast	44.00-45.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	42.00-47.00
R.R. Malleable	60.00-62.00
Rails, Rerolling	52.00
Rails, Random Lengths	50.00-51.00
Rails, 3 ft and under	52.00-55.00
Cast Steel	50.00-52.00
Railroad Specialties	50.00-52.00
Uncut Tires	43.00-43.50
Angles, Splice Bars	50.00-52.00

VALLEY

No. 1 Heavy Melt. Steel	$42.50-43.50
No. 2 Heavy Melt. Steel	41.50-42.50
No. 1 Bundles	42.50-43.50
Machine Shop Turnings	36.00-37.00
Short Shovel Turnings	38.00-39.00
Cast Iron Borings	34.00-35.00
Low Phos.	46.50-47.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	42.00-47.50

MANSFIELD

Machine Shop Turnings	37.50
Short Shovel Turnings	37.00-38.50

CINCINNATI

No. 1 Heavy Melt. Steel	$41.00
No. 2 Heavy Melt. Steel	41.00
No. 1 Busheling	41.00
No. 1 Bundles	41.00
No. 2 Bundles	41.00
Machine Shop Turnings	35.00
Mixed Borings, Turnings	34.00
Short Shovel Turnings	37.00
Cast Iron Borings	36.00

Cast Iron Grades

No. 1 Cupola Cast	48.00
Charging Box Cast	40.00
Heavy Breakable Cast	42.00
Stove Plate	40.00
Unstripped Motor Blocks	39.00
Brake Shoes	36.00
Clean Auto Cast	47.00
Drop Broken Cast	50.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	42.00
R.R. Malleable	58.00
Rails, Rerolling	48.50
Rails, Random Lengths	46.50
Rails, 18 in. and under	51.00

DETROIT

(Dealers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$34.50-35.00
No. 1 Busheling	34.50-35.00
Nos. 1 & 2 Bundles	34.50-35.00
No. 3 Bundles	34.50-35.00
Machine Shop Turnings	28.50-29.00
Mixed Borings, Turnings	28.50-29.00
Short Shovel Turnings	29.50-30.00
Cast Iron Borings	29.50-30.00
Punchings & Plate Scrap	40.00-41.00

Cast Iron Grades

No. 1 Cupola Cast	45.00-46.00
Heavy Breakable Cast	38.00-39.00
Clean Auto Cast	45.00-46.00

BUFFALO

No. 1 Heavy Melt. Steel	$41.50-43.50
No. 2 Heavy Melt. Steel	39.50-40.50
No. 1 Busheling	39.50-40.50
No. 1 & 2 Bundles	39.50-40.50
Machine Shop Turnings	33.00-34.00
Mixed Borings, Turnings	33.00-34.00
Cast Iron Borings	33.00-34.00
Short Shovel Turnings	34.00-36.00
Low Phos.	44.50-45.50
Elec. Furnace Bundles	44.00-46.00

Cast Iron Grades

No. 1 Cupola	43.00-44.00
Heavy Breakable Cast	37.00-38.00
Malleable	52.00-55.00
No. 1 Wheels	44.00-46.00

Railroad Scrap

Rails, 3 ft. and under	48.00-51.00
Railroad Specialties	48.00-49.00

PHILADELPHIA

No. 1 Heavy Melt. Steel	$42.00
No. 2 Heavy Melt. Steel	42.00
No. 1 Busheling	42.00
No. 1, No. 2 Bundles	42.00
No. 3 Bundles	40.00
Machine Shop Turnings	33.50
Mixed Borings, Turnings	33.50
Short Shovel Turnings	35.00
Bar Crop and Plate	46.50-47.50
Punchings & Plate Scrap	46.50-47.50
Cut Structurals	46.50-47.50
Elec. Furnace Bundles	44.50
Heavy Turnings	43.00
No. 1 Chemical Borings	36.00-37.00

Cast Iron Grades

No. 1 Cupola Cast	48.00-49.00
No. 1 Machinery Cast	50.00-52.00
Charging Box Cast	48.00-49.00
Heavy Breakable Cast	48.00-49.00
Unstripped Motor Blocks	45.00-46.00
Malleable	58.00-60.00
Clean Auto Cast	50.00-51.00
No. 1 Wheels	49.00-50.00

NEW YORK

(Dealers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$38.00
No. 2 Heavy Melt. Steel	38.00
No. 1 Busheling	38.00
Nos. 1 & 2 Bundles	38.00
No. 3 Bundles	36.00
Machine Shop Turnings	29.00-30.00
Mixed Borings, Turnings	29.00-30.00
Short Shovel Turnings	31.00-33.00
Punchings & Plate Scrap	40.00
Cut Structurals	40.00
Elec. Furnace Bundles	40.00

Cast Iron Grades

No. 1 Cupola Cast	43.00-44.00
Charging Box Cast	43.00-44.00
Heavy Breakable	43.00-44.00
Unstripped Motor Blocks	40.00
Malleable	54.00-55.00

BOSTON

(Fob shipping point)

No. 1 Heavy Melt. Steel	$31.00-32.00
No. 2 Heavy Melt. Steel	29.00-30.00
No. 1 Bundles	30.00-31.00
No. 1 Busheling	29.00-30.00
Machine Shop Turnings	26.00-27.00
Mixed Borings, Turnings	27.00-28.00
Short Shovel Turnings	27.00-28.00
Bar Crops and Plate	32.00-33.00
Punchings & Plate Scrap	32.00-33.00
Chemical Borings	28.00-29.00

Cast Iron Grades

No. 1 Cupola Cast	42.00-44.00
Charging Box Cast	38.00-39.00
Heavy Breakable Cast	38.00-39.00
Stove Plate	38.00-39.00
Unstripped Motor Blocks	36.00-37.00
Clean Auto Cast	40.00-42.00

CHICAGO

No. 1 Heavy Melt. Steel	$38.50-39.00
No. 2 Heavy Melt. Steel	38.50-39.00
Nos. 1 & 2 Bundles	38.50-39.00
No. 3 Bundles	36.50-37.00
Machine Shop Turnings	33.50-34.00
Mixed Borings, Turnings	33.50-34.00
Short Shovel Turnings	35.50-36.00
Cast Iron Borings	34.50-35.00
Bar Crops and Plate	41.00-41.50
Cast Steel	41.00-41.50
Punchings	44.50-45.00
Elec. Furnace Bundles	39.50-40.00
Heavy Turnings	38.00-38.50
Cut Structurals	43.50-44.00

Cast Iron Grades

No. 1 Cupola Cast	48.00-50.00
Malleable	48.00-49.00
Clean Auto Cast	48.00-50.00
No. 1 Wheels	45.00-46.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	44.00-45.00
Malleable	62.00-63.00
Rails, Rerolling	55.00-56.00
Rails, Random Lengths	48.50-49.50
Rails, 3 ft and under	51.00-52.00
Rails, 18 in. and under	52.00-53.00
Railroad Specialties	47.50-48.50
Angles, Splice Bars	49.00-50.00

ST. LOUIS

No. 1 Heavy Melt. Steel	$39.00-40.00
No. 2 Heavy Melt Steel	36.00-37.00
Machine Shop Turnings	27.00-30.00
Short Shovel Turnings	33.00-34.00

Cast Iron Grades (Fob shipping point)

No. 1 Cupola Cast	42.00-43.00
Charging Box Cast	39.00-40.00
Heavy Breakable Cast	35.00-36.00
Brake Shoes	40.00-41.00
Clean Auto Cast	42.00-43.00
Burnt Cast	35.00-37.00

Railroad Scrap

R.R. Malleable	58.00-60.00
Rails, Rerolling	48.00-49.00
Rails, Random Lengths	42.00-43.00
Rails, 3 ft and under	48.00-50.00
Uncut Tires	43.50-44.50
Angles, Splice Bars	46.00-47.00

BIRMINGHAM

No. 1 Heavy Melt. Steel	$34.00-35.00
No. 2 Heavy Melt. Steel	34.00-35.00
No. 1 Busheling	34.00-35.00
Nos. 1 & 2 Bundles	34.00-35.00
No. 3 Bundles	31.00
Long Turnings	24.50
Short Shovel Turnings	26.00-27.00
Cast Iron Borings	25.00
Bar Crops and Plate	38.50
Cut Structurals	38.50

Cast Iron Grades

No. 1 Cupola Cast	41.00
Stove Plate	39.00
No. 1 Wheels	36.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	37.00
R.R. Malleable	42.50
Axles, Steel	39.00
Rails, Rerolling	41.00
Rails, Random Length	39.00
Rails, 3 ft and under	41.00
Angles and Splice Bars	41.00

SAN FRANCISCO

No. 1 Heavy Melt. Steel	*$22.00
No. 2 Heavy Melt. Steel	*22.00
No. 1 Busheling	*22.00
Nos. 1 & 2 Bundles	*22.00
No. 3 Bundles	*17.00
Machine Shop Turnings	*12.50
Bar Crops and Plate	22.00
Cast Steel	22.00
Alloy Free Turnings	12.50
Cut Structurals	22.00
Tin Can Bundles	17.00

Railroad Scrap

Axles	29.00
Rails, Random Lengths	23.50
Uncut Tires	30.50

*Fob California shipping point.

SEATTLE

No. 1 Heavy Melt. Steel	$24.00
No. 2 Heavy Melt. Steel	24.00
No. 1 Busheling	24.00
Nos. 1 & 2 Bundles	22.00
No. 3 Bundles	22.00
Machine Shop Turnings	14.50
Mixed Borings, Turnings	14.50
Punchings & Plate Scrap	24.50
Cut Structurals	24.50

Cast Iron Grades

No. 1 Cupola Cast	30.00
Charging Box Cast	24.00
Heavy Breakable Cast	23.00
Stove Plate	24.50
Unstripped Motor Blocks	23.00
Malleable	30.00
Brake Shoes	30.00
Clean Auto Cast	30.00
No. 1 Wheels	25.50

Railroad Scrap

No. 1 R.R. Heavy Melt.	22.00
Railroad Malleable	30.00
Rails, Random Lengths	21.50
Angles and Splice Bars	23.00

LOS ANGELES

No. 1 Heavy Melt. Steel	$25.00
No. 2 Heavy Melt. Steel	25.00
Nos. 1 & 2 Bundles	25.00
Machine Shop Turnings	16.00
Mixed Borings, Turnings	15.50-16.00
Punchings & Plate Scrap	28.00
Elec. Furnace Bundles	28.00

Cast Iron Grades

No. 1 Cupola Cast	35.00-36.00

Plates . . .

Prices continue to be quoted at recent levels, with one exception

Plate Prices, Page 161

New York — Except for one eastern Pennsylvania seller, noted in last week's issue as having advanced prices, plate producers generally continue to quote at recent levels, and with scrap prices easing again, there is some question as to whether other mills will take action at this time. However, all are watching the raw material situation closely.

Meanwhile, producers are loosening up a bit on the acceptance of tonnage from regular customers for first quarter, with most sellers likely to have their quotas for the entire period within the next few days. It is considered probable that the new tonnage involved in these quotas will be a shade heavier than for the current quarter, as some mills at least are making some headway on backlogs by virtue of close scheduling.

Philadelphia — District plate mill operations are being sustained, although substantially higher output could be achieved if pig iron and scrap were more plentiful. Mills are making some progress on order backlogs, but this is due primarily to limiting new orders and cancelling old ones when possible. More first quarter business is now being entered as producers set up new quotas. Consumers with regular sources of supply are counting on a shade more tonnage than they are now receiving.

Cleveland — Curtailment by some producers of plate producion in favor of more profitable products has intensified demand on other producers. In greatest demand are 1/4, 3/16, and 3/8 inch. Some producers are reported selling all their plate through their warehouses rather than from the mill at mill prices.

Birmingham — Structural awards shows some acceleration over the past week or two. Indications are, however, that most of the tonnage is against orders already placed with the result that placing of new tonnage is just about as difficult as ever. A slightly better balance of inventories is indicated in the district.

Steel Bars . . .

Bar Prices, Page 160

Philadelphia — Hot-rolled carbon bar producers are setting up first quarter quotas, with indications that new tonnage will be somewhat heavier. Arrearages at the beginning of the new quarter should not be quite as heavy as at the beginning of the current period, and there may be some additional relief as new facilities get into operation. However, stringency will continue pronounced in the small sizes.

On cold-drawn carbon bars and on the alloy grades, relative easiness likely will continue. Alloys are available in four to six weeks, and cold-drawn carbon steel can be had for delivery before the end of the year in most sizes. Most cold drawers have long since opened their books for next year, with some having now entered orders for third quarter. Nevertheless, with supply fairly easy, consumers are not disposed to commit themselves too far into the future, and this is especially true in alloys.

Cleveland — Increased demand is noted for hot-rolled carbon bars under 1 inch but outlook for satisfying it soon is not bright in view of the tight demand-supply situation that has prevailed in the smaller sizes. Substantial portion of this increase is reported coming from bolt, nut and rivet makers, whose operations are at high levels. Some increase in demand also is reported for larger hot-rolled carbon bars for rebuilding of jobbers' stocks.

Leon A. Beeghley Named To Sheet & Tube Board

Youngstown — Frank A. Scott has resigned as a director of the Youngstown Sheet & Tube Co. and has been succeeded on the board by Leon A. Beeghley, president of the Standard Slag Co. and the Metal Carbides Co., both of Youngstown.

J. C. Argetsinger, vice president and general counsel for Sheet & Tube, is recovering from illness and during his absence James E. Bennett has been elected temporary assistant general counsel and acting secretary of the company.

Tin Plate . . .

Tin Plate Prices, Page 161

Washington — Country allocations of tin plate for the first quarter of 1948 will be 142,000 tons, unchanged from the fourth quarter of 1947, according to the Office of International Trade. Of the total, 120,000 short tons will be used for packaging abroad of perishable food products for which supply assistance will be made available through the OIT by the use of the symbol CXS (certified export steel) on validated export licenses.

In addition to the amount with priority rating, there has been allocated for export 10,000 tons of unrated tin plate for the packing of food to be brought back to the United States. There is also available for export an allocation of 12,000 tons of tin plate (0.50 pound electrolytic tin coating) which will be considered for approval on the basis of certain other essential end uses. This tonnage will not carry a priority rating.

Countries granted the largest allocations, in tons, include the following: Australia, 12,000; Brazil, 11,000; Netherlands, 9500; Argentina, 8500; South Africa, 6500; Norway, 6000; Belgium, 5500; Italy, 5000; Mexico, 4500; Cuba, 4300; Sweden, 3500; Chile, 3500; New Zealand, 3200; French North Africa, 3200; Portugal, 3200; Switzerland, 3200; France, 3000; India, 2500; Denmark, 1800; China, 1500; Netherlands East Indies, 1500; Middle East, 1450; Uruguay, 1400; Philippines, 1200; Turkey, 1000; Greece, 1000; Peru, 900; Venezuela, 800; Colombia, 700; Madagascar, 650; and Straits Settlements, 600; Eire, 450; Indo-China, 400; Spain, 350; Southern Rhodesia, 285; and Hong Kong, 280. The balance was distributed to countries receiving 200 tons or less, while 4036 tons were reserved for contingency for other destinations.

Structural Shapes . . .

Structural Shape Prices, Page 161

New York — Structural activity continues fairly active, with more private work adding to the general total than heretofore. It is believed that stabilization of costs, even at present high levels, will go far toward stimulating further activity. One of the larger projects in sight is a veterans hospital in Newark, N. J., requiring approximately 5000 tons.

Most fabricators have substantial backlogs, with some of the larger booked ahead six to seven months and selecting tonnage carefully.

Philadelphia — Although district fabricating shops are booked six months or longer ahead in most instances, structural shape demand here is rather spotty. Work being figured is fairly substantial, but orders are light. Outstanding award involves 1500 tons for the Southwest Municipal airport, placed with Bethlehem Steel Co., Bethlehem, Pa., which also closed on 400 tons of bars for the same project.

Birmingham — Structural awards have been relatively light most of the year. A substantial tonnage is pending, with some projects advancing as far as the blueprint stage. Construction circles, however, insist there will not be a great deal of major work as long as building costs are so uncertain.

Seattle—Fabricators have sizable backlogs but shortage of steel is hampering production. Some relief has been afforded by the arrival of strike-delayed water shipments, but mill allocations are inadequate and plants could use twice the amount of steel available. New business is generally confined to jobs involving small tonnages.

Tubular Goods . . .

Tubular Goods Prices, Page 161

Pittsburgh — Barring strikes and other interruptions to production schedules, output of pipe next year is expected to increase slightly over that for 1947. It is not likely the Marshall plan will involve much pipe for export, but any steel taken from producers will reduce the supply available for pipe. Production of oil country tubular goods this year is expected to reach a new record, exceeding the previous peak of 1,418,579 net tons registered during 1937. The spread between supply and demand for drill pipe has narrowed in recent months, notably in case of API drill pipe. However, there is no immediate prospect the augmented requirements for casing and tubing, as well as line pipe, can be satisfied for months to come.

Seattle—Cast iron pipe agencies reported limited inquiry for their goods. This apathy is attributed to seasonal conditions, also to slow and uncertain deliveries, which at present are approximately 18 months. However, the potential demand is of large proportions and important projects are expected to be up for figures about the end of the year.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 160

Cleveland — Demand for concrete reinforcing steel bars is so much in

excess of supply that a New York export house making inquiries in Cleveland for 800 tons for shipment to South Africa offered to accept them in cold finished alloy despite the sizable differential in price between such a product and the customary carbon reinforcing bar. However, one producer declined to make quotations because it did not want to see such high-grade steel diverted to such a use as reinforcing.

Seattle—Reinforcing bar mills are at peak capacity, making every effort to speed deliveries and reduce backlogs. One plant reports it is completely booked for the first quarter, another that current commitments will carry it well into the new year. Demand continues insistent, in some instances contractors finding it difficult to obtain tonnage. Several sizeable projects are pending.

Wire . . .

Wire Prices, Page 161

Pittsburgh—Pressure for prompt shipment of merchant wire items has shown no signs of easing with exception of that for fence in some areas. The demand-supply situation in nails has become further unbalanced in recent weeks and the scarcity is expected to be accentuated next year due to scheduled construction of 1.5 million family units, a sharp increase over 1947. Construction of family units this year probably will fall about 15 per cent below the 800,000 program goal. The program for next year of 1.5 million units (expected to be maintained for about 10 years) would require about 9 million kegs of nails or nearly 50 per cent of the industry's annual output. In addition to housing requirements, an unusually heavy demand for nails is required for packaging. Monthly output of nails is currently estimated at around 65,000 tons, and producers hope to gradually boost output in the months ahead. The industry is booked through first quarter and well into the second period next year.

Cleveland — Decline in demand for wire specialties has opened some capacity for them, a producer reported. Among specialties on which there is open capacity are bookbinder wire and stitching wire. However, nonspecialty wire capacity is still jammed and there is no evidence yet as to when this pressure will slacken. Big backlogs remain for fencing, as farmers, in a better financial position than they have been for years, seek to rebuild long-neglected fences. Continued heavy demand for housing keeps pressure for nails far ahead of supply.

Chicago—Wiremakers report a somewhat diminished demand for stainless and music wire, but all other items continue under heavy pressure. In the manufacturers' grades, requirements lump strongest for high-carbon spring wire, bolt wire and miscellaneous low-carbon wires. In the merchant classification, demand from builders supply houses for galvanized roofing nails is tremendous. Reports are numerous that building type nails change hands at prices up to double cost at mill.

Birmingham — Demand for wire products seems to be endless. This is true not only of manufacturers wire, but of every item in the category with particular emphasis upon nails and wire fencing. Long-delayed cold weather and rain continues to bring out demand for wire from agricultural sources. Jobbers are allocating to the best of their ability.

St. Louis—For levee and flood control work, demand for wire strand and reinforcing wire fabric is strong, the bulk of the tonnage being bought by the U. S. engineer, Memphis. That office closes Nov. 6 on 2800 tons, 7/16 inch, seven-wire uncoated steel wire strand. Only bidder on 492,000 squares of noncorrosive reinforcing fabric recently was Copperweld Steel Co., Glassport, Pa., quoting $4.74 per square.

Colorado Fuel & Iron Corp. Plans $7 Million Expansion

Colorado Fuel & Iron Corp., Denver, announced an expansion and modernization program last week which will involve approximately $7 million. Major items will include a rod mill for the Pueblo, Colo., plant which, together with wire mill improvements, will bring an increase of about 33 per cent in wire-producing capacity. Rehabilitation of the blast furnace at the Buffalo plant, which has been idle for four years, will help relieve a shortage of pig iron.

C. W. Meyers, president, said the company's plants still are operating at maximum capacity.

Rails, Cars . . .

Track Material Prices, Page 161

New York — While final returns are not as yet in, all indications point to another good total of freight car awards for the month just ended. One of the latest awards involves 1000 coal cars to be built by the Virginian Railway in its own shops.

Railroads on Oct. 1 had unfilled orders for 116,546 freight cars, or 2000 cars higher than a month earlier, according to Association of American Railroads. Class 1 roads had 841 locomotives on order at the beginning of October compared with 555 on Oct. 1, 1946. Of the total, 791 were for diesel locomotives, 46 for steam and 4 for electric. Class 1 railroads and refrigerator car companies put 38,572 new freight cars on roads in the first nine months of this year, or about 8000 over the like 1946 period.

Cleveland — Chesapeake & Ohio Railway will purchase 45 new locomotives and 200 automobile cars at a total estimated cost of $10,900,000. This equipment will be in addition to $60,750,000 of passenger, freight car and locomotives on order. Locomotives to be purchased include 15 simple mallet-type mountain locomotives and 30 heavy-duty steam switching engines. Automobile cars will be the large type and will be equipped with Evans automobile loaders.

Pittsburgh — Railroad carbuilders and repair shops have submitted a detailed breakdown of steel, including types of sections, required to meet the 10,000 freight car monthly construction program in addition to that needed for maintenance and repair of cars.

Sheets, Strip . . .

First quarter quotas being issued, or expected soon, on about present basis

Sheet Prices, Page 160

New York—Sheet sellers are beginning to open their books for first quarter. Some producers indicate that quotas may include a little more new tonnage than heretofore, but it is still too early to gage just what the overall situation will be. Demand continues pressing, and except for stainless sheets and some few specialties, deliveries continue tight. Stainless sheets can be had for shipment within five to six weeks, although some producers are booked ahead as far as eight weeks.

Pittsburgh — Despite record sheet and strip production last month, most sellers were unable to make much headway against carryover tonnage and report there has not developed any easing in pressure for deliveries. Supply is not expected to be in balance with demand until well into 1948 at earliest, although some gradual relief from installation of additional cold-reduction mills or speed-up programs will help ease the supply situation through first half of next year. Demand for stainless steel items is improving, according to some sellers. In comparison with other stainless items, demand for stainless sheets and strip has held up fairly well.

Philadelphia — Most sheet consumers with regular sources of supply are reconciled to receiving about the same tonnage in the first quarter as they are now getting. However, they could use considerably more if it were available. First quarter quotas are now being issued on about the present average basis. Consumers without regular sources of supply continue to operate on a generally restricted and day-to-day basis.

Chicago — An important sheet and strip maker here is expected to have its customers' quotas worked out and books opened for 1948 by Nov. 15, and by that time consumers will have been advised of tonnages allocated to them. Despite the outlook for continued tight supplies, consumers still continue to press for bigger quotas and faster shipments in the hope that manufacturing facilities can be utilized closer to capacity. Low supply of material in warehouses is increasing the pressure against mills.

State of Minnesota received no bids on 500 tons of steel for automobile license plates.

Cincinnati—District sheet mills are pushing ingot producing units to feasible capacity, and rolling schedules are consistently at a high level. Despite these efforts, output in the next two months will be insufficient to cut much, if any, tonnage from the carryovers. All indications point to a supply situation after the first of the year as tight as in recent months.

Birmingham — No letup in demand is reported for sheets and strip. Even though output continues at a record peacetime level, demand continues greatly in excess of production. A large tonnage of strip, consisting mostly of cotton ties and barrel hoops, is moving from the district, although the squeeze is not nearly so great as for sheets.

Pig Iron . . .

No relief seen from pig iron shortage over next six months at least

Pig Iron Prices, Page 162

Pittsburgh — No relief from the critical pig iron shortage is indicated over the next six months at least. Critical scarcity of scrap has forced integrated mills to increase proportion of hot-metal charge in the open hearths, which in turn has further restricted amount of iron for the merchant trade. Indicative of the tremendous pressure for pig iron is fact that all of the 46 blast furnaces in this district are pouring iron. However, a number of hard-pressed units will need relining soon, which will accentuate the overall iron shortage. Although relatively poor quality coke remains an operating problem for many foundries, most are more concerned over fact that iron supply is sufficient to sustain operations only at 60 to 70 per cent of capacity.

New York — Pig iron receipts by local consumers in October, on a daily basis, were smaller with indications that there will be little if any improvement during November. However, actual melt in district foundries in October was fairly well sustained, due to increasing consumption of scrap and alloying materials, but whether they will be able to maintain this pace remains to be seen, for scrap supply at some foundries is on a day-to-day basis.

Coke supply shows general improvement over a few weeks ago, with consumers taking in all of the suitable grades they can obtain. Even though the outlook with regard to pig iron and scrap is spotty, foundries would like to build up a coke supply if at all possible, especially with winter coming on.

Buffalo—Pig iron market continues tight with output far short of filling demand. Interest centers in reports that the only two idle furnaces in the area are slated to resume operations in the near future. Hanna plans to put its fourth furnace back into operation within a few days. The furnace was banked about two months because of a coke shortage. Coke is expected to be brought in from an outside source to augment an inadequate local supply. Considerable interest is attached to the second stack which is located at the Wickwire-Spencer Steel Division plant of the Colorado Fuel & Iron Corp. in Tonawanda. The furnace has been idle for about four years. It will be relined and rehabilitated as part of a $7 million improvement program. The other Wickwire blast furnace is operated under contract by the Republic Steel Corp., which provides hot metal to the Wickwire plant.

Philadelphia — Daily movement of pig iron in this district is expected to show no improvement this month, nor much gain throughout the coming winter months. Not only are mill operations being adversely affected but some foundries have been forced to close down completely for limited periods. Of all major materials required by foundries, coke is in best supply. This is ascribed to the fact that one large district blast furnace, with coke oven facilities, is down for

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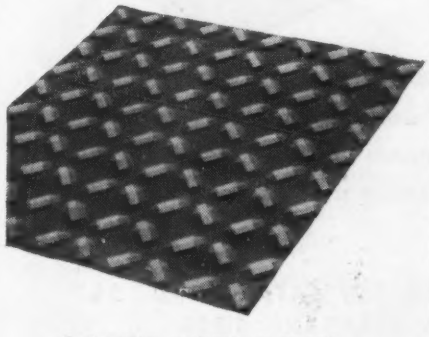

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repairs, making it possible to divert coke elsewhere. Many of the company's regular foundry customers are taking advantage of this situation to build up inventories for the coming winter.

Coatesville, Pa.—E. and G. Brooke Iron Co., Birdsboro, Pa., has agreed to sell for a period of five years the major part of its pig iron production to a group of steel companies consisting of Lukens Steel Co., Coatesville, Pa.; Worth Steel Co., Claymont, Del.; and Warren Foundry & Pipe Corp., New York, with plants at Phillipsburg, N. J. and Everett, Mass.

Chicago — Insufficient pig iron is causing numerous foundries to scale down their melting operations, which for months have been geared to iron receipts. This situation exists in spite of the fact that more blast furnaces are operating in this district than at any time in history and total production is an all-time high. However, because of inadequate scrap supply, steel mills are obliged to use maximum tonnages of hot metal to maintain their operating rates at the current rate of close to 95 per cent. Under these conditions, amount of iron available for sale is restricted and abnormally low.

Cleveland — Keyed to prices of iron and steel scrap, the price of basic pig iron produced by one company here jumped last week to a new postwar high of $42.25 a ton, fob furnace. This in turn pushed No. 2 foundry iron up to $42.75 and malleable to $43.25.

Cincinnati—Customary acceleration of pig iron shipments in the latter part of the month enabled furnaces to complete October allotments without carryover. Foundries have been forced to adjust the melt to the quota of materials, and with little or no chance of expansion in the next 60 days at least.

Birmingham — Pig iron supply continues to lag behind the district's needs, even though some Texas iron is moving into the district and current supply is being supplemented, to a certain extent, by "pan mined" iron from Cleburn county. Some 240 tons daily are said to be moving here, mostly to merchant melters.

Los Angeles—Foundries are in desperate need for pig iron here, as well as coke and scrap. A shutdown of some foundries threatens due to the shortages of raw material. Small shipments of pig iron are arriving here from Geneva, Utah, at $43.12 and from Texas at $50.57.

Seattle—Demand for foundry products is slowing and operations are being curtailed accordingly, some plants running only four days a week. Plants report no pig iron is being shipped from Utah furnaces, apparently being diverted to other uses. Local inventories are practically exhausted, resulting in an increased consumption of cast iron scrap. The latter is scarcer and the market firm. Buyers are holding the price at $27.50 gross.

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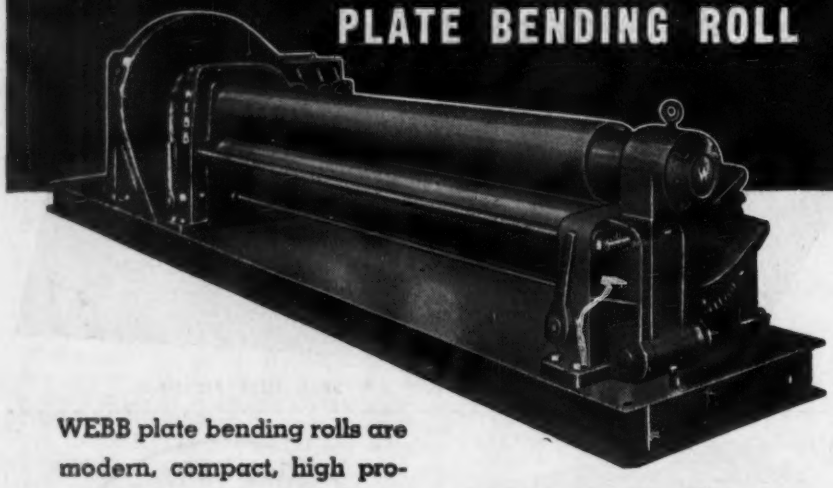

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New Pig Iron Manual Is Issued by Steel Institute

New York — A new book that will give information on pig iron manufacture, the characteristics of the various kinds of pig iron and the effects of various elements on the characteristics and properties of iron is being prepared jointly by the American Iron & Steel Institute's Committee on Merchant Pig Iron and the Technical Committee on Pig Iron & Ferroalloys. The former committee is also making a world-wide survey which will show the location and capacity of all foreign merchant furnaces, their brand names and the chemical composition of the various brand-name irons. The technical committee has prepared a new edition of Steel Products Manual, Section 1, covering pig iron and ferroalloys.

Semifinished Steel . . .

Semifinished Prices, Page 160

Chicago — Leading producers here are not posting prices nor selling carbon steel rerolling ingots on a Chicago or Gary basis. The open market price is difficult to determine, but sales have been reported from $70 to $120 a ton. None of the leading producers are posting prices or selling forging quality ingots on a Chicago or Gary basis.

One leading seller offers rerolling billets, blooms and slabs at $45, fob mill, Chicago or Gary, while another producer offers the same items at $47, fob mill. At least three producers in this district sell forging quality billets, blooms and slabs at $55, fob mill, Chicago or Gary.

No producer in this district posts a price for or sells sheet bars.

Scrap . . .

Pittsburgh mill buys heavy melting at $40, off $3 from previous sale

Scrap Prices, Page 166

Pittsburgh — Reported sales of 5000 tons of heavy melting steel scrap for local delivery at $40, off $3 from recent peaks, was reported last week. There is no assurance, however, that this marks the end to the upward trend in scrap prices, though determined efforts are being made both by buyers and sellers to hold the market in check. The fact that mills have withdrawn from the market, however, doesn't alter the fundamental problem of correcting a critical scrap shortage.

One factor that should help stabilize the scrap market is threat of governmental action to curb inflationary forces. The threat of return of price control in a modified form, while remote at present, could offset the pressure for higher prices which has resulted from the critical shortage of scrap.

The unfortunate feature about the recent upturn in prices to abnormally high levels is that very little, if any, additional material will be made available to the mills. Present scrap prices are over 100 per cent above the prewar level and, it is contended in some quarters, are not justified from the standpoint of collection and distribution costs that have occurred in the interim.

Mill scrap stocks range between 4 to 8 weeks in this district. With some interests outside the district having less than 3 weeks' supply on hand, it is questionable how long some mills can stay out of the market, although large tonnages at higher prices have been placed for November shipment. If present record peacetime steel output is to be maintained, no long interruption to the steady flow of scrap to the mills can be sustained. One large producer, currently out of the market, states that scrap inventories are ample for about 6 weeks' operations and this period undoubtedly will be lengthened as a result of shipments on order at above the present $40 level that are still outstanding. However, this interest admits it is a rugged proposition to force dealers and brokers to complete shipments on old $38 orders, and adds it would be difficult to place a large tonnage order at the $40 level in today's market, as reflected in brokers' offerings up to $42.50 for dealers' scrap.

The consensus of most trade authorities is that open hearths must be kept operating regardless of the cost of scrap which, in combination with prospective higher rail freight charges and increases in other production costs, might necessitate higher finished steel prices.

Brokers who accepted the recent $40 tonnage order contend they have to sustain a loss in filling their commitments, even though the entire order represented only slightly over 5000 tons. In this connection, the $40 quotation is a fictitious price established at a timely moment to stem the upward price spiral that was gaining momentum. Brokers point out that as long as prices in the East and

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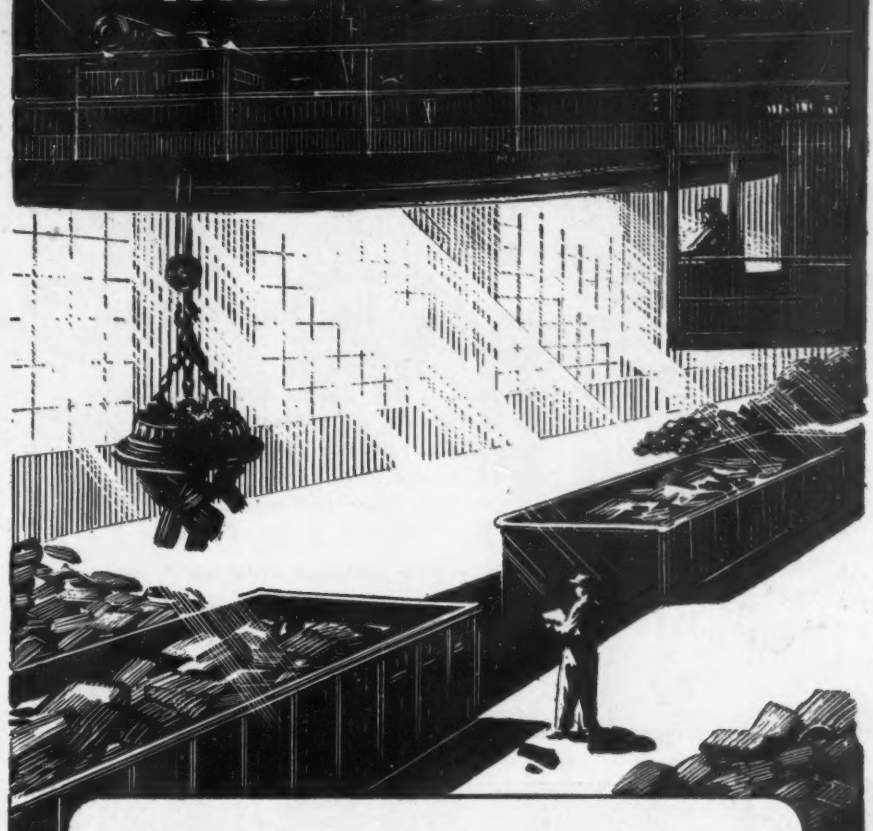

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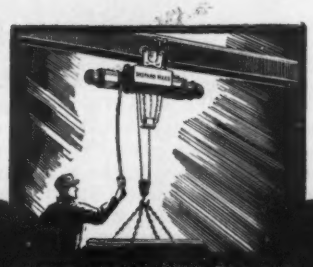

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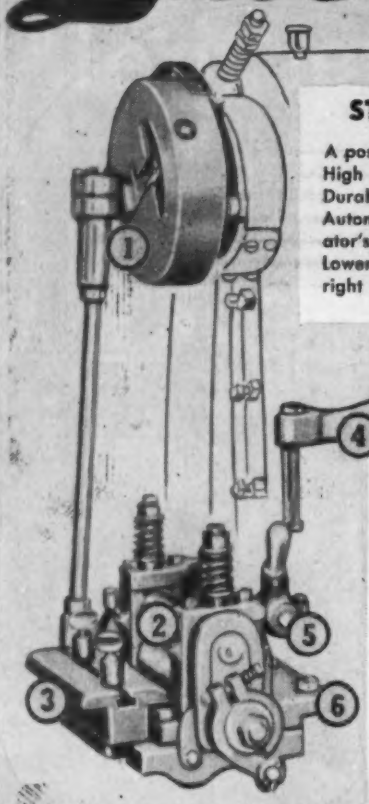

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Valley remain at present high levels, shipments of scrap into this district cannot be delivered to local mills for less than $45. If prices in other areas are sustained when mill buying is resumed, the Pittsburgh mills will have to accept the higher price levels for the remote scrap to keep material moving here.

With higher-priced orders still outstanding, brokers were unable to buy heavy melting steel at $39.50 to cover the latest reported sale at $40.

Reflecting the unbalanced demand-supply situation, cast iron grades advanced up to $2 a ton last week with offerings at still higher prices. A substantial tonnage of low phos scrap was sold last week at $47.50, short shoveling turnings at $36.50 and No. 1 cupola cast at $48.

Boston—Sharp fluctuations in steelmaking scrap prices brought transactions to a complete halt last week. No. 1 heavy melting steel was quoted at midweek at around $31, fob shipping point, but there was nothing more definite on which to base this quotation than reported buying by brokers at Pittsburgh. Confusion growing out of price uncertainty has never been equaled in this territory.

Overshadowing the price situation from a long-term viewpoint is the definite shortage of No. 1 steel scrap. A survey just completed by buyers for larger consumers in this district indicates tonnage is limited and more suppliers are turning to ship-breaking. Preparation of this scrap is costly and when broken down the cost is substantially over that for yard scrap, even at recent inflated prices.

The recent drop in price for heavy melting steel scrap was the sharpest ever registered in a given period, amounting to nearly $7 in 24 hours. Consumer inventories of steeel scrap are low which, coupled with small reserves of pig iron, would bring about curtailment in open-hearth production should transportation or other delays occur.

Philadelphia — Delivered eastern Pennsylvania prices on steelmaking grades held nominally unchanged last week at $42. A few small purchases of none too significant character were actually done as high as $43, but this price disappeared quickly as the market leveled off and consumers generally withdrew. Some trade interests believe it will be another 10 days or so before the market comes up for further test. Meanwhile, scrap placed against the higher-priced orders is coming out freely. Some consumers of steelmaking scrap are striving for a stabilized market of around $38. All other grades of scrap are also nominally unchanged with the market in some cases nominal.

The market continues to show fundamental strength with mill inventories averaging 20 to 30 days, against a desired 60 to 90 days' supply. Some interests believe that as long as the steel industry continues to operate in the upper 90's there will be a stringency which will keep prices from dipping much further. However, some large consumers insist the market could go substantially lower without jeopardizing supply too greatly.

Mills generally are drawing on more steel scrap to round out their melts than at any time in peacetime history, with the ratio of scrap to pig iron so high that producers are reluctant

to indicate what their present ratio actually is.

New York — Brokers' buying prices were unchanged last week throughout the list, with major melting steel grades still holding at $38, fob shipping point. Leading consumers remained out of the market. Meanwhile, scrap at present levels is coming out fairly freely and is being applied to consumer orders placed a fortnight or so ago.

Chicago — Mill resistance to high scrap prices has resulted in re-establishment of $39, delivered, for open-hearth material. This is a drop of $4 a ton from the price paid by a few consumers two weeks ago when the market skyrocketed. For several days important steelmakers withheld buying. While the situation remains strong because scrap is in short supply, at least two major mills bought at the $39 figure last week. Supporting evidence that the lower market prevails is that brokers are able to purchase some tonnage at $38.50.

Railroad grades continue to hold most of their recent strength. Brokers appear sympathetic to efforts of mills to stabilize the market which at present level is generally regarded as too high. However, the test will rest in whether present prices will bring out enough scrap to maintain present high rate of steelmaking operations.

Cleveland — Withdrawal of big consumers from the market last week temporarily checked the inflationary movement in the price of No. 1 heavy melting steel scrap. With winter nearing and steel producers' inventories of scrap none too comfortable, there is conjecture as to how long consumers can remain out of the market to stifle inflationary tendencies in scrap prices. While scrap was moving to consumers on old orders, no new orders were placed last week. Last orders placed were those of about two weeks ago, at a top of $43. Big consumers were offering last week to pay $39.50 for No. 1 heavy melting. Pressure for foundry grades of scrap continued relentlessly last week as foundries, unable to get sufficient pig iron, sought to increase the proportion of scrap in their melts.

Buffalo—While leading mill consumers refuse to place any sizable tonnage orders for scrap above the old range of $37 to $38 a ton for No. 2 heavy melting and bundles, prices strengthened as dealers, holding orders within the old range, were caught by rising markets elsewhere. Prices actually are $2 to $2.50 higher as dealers reported paying $39.50 to $40.50 to cover sales for No. 2 material and bundles. In addition, sales of No. 1 heavy melting were reported at $41.50 to $43.50. Confusion and nervous tension grip the trade. Local dealers report participating in area sales to Pittsburgh buyers.

Further strength developed in the turnings market. Machine shop offerings jumped $1 to a range of $33 to $34 while short shoveling material was up $1 to $2 a ton to a range of $34 to $36. Railroad scrap again stiffened with short rails advancing up to $3.50 to a range of $48 to $51.

Although mills' reserve stockpiles at present time are not sufficient to maintain capacity operations throughout the winter months, the majority of consumers express satisfaction with present stocks. In addition to

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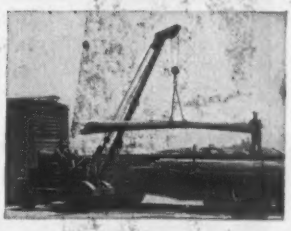
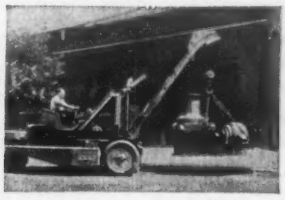
* *Names upon request.*





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recent improvement in the local scrap movement, there have been increased shipments by water. One of the top mills reports 25,000 tons still to arrive from Duluth.

Cincinnati—Both suppliers and melters of scrap have taken a sideline position until the price situation is clarified. Brokers are moving tonnage against old contracts, and shying from heavy commitments until prices are stabilized. Present quotations are nominal. There is some evidence of a freezing of available supplies. Some of this tonnage may be held on speculation, the outlook being for a definite scrap shortage during the winter. Some of the tonnage may be held to carry the profits into the next tax year. Mills are fairly well supplied for the near term, but foundries need more scrap in the face of a severe pinch in pig iron.

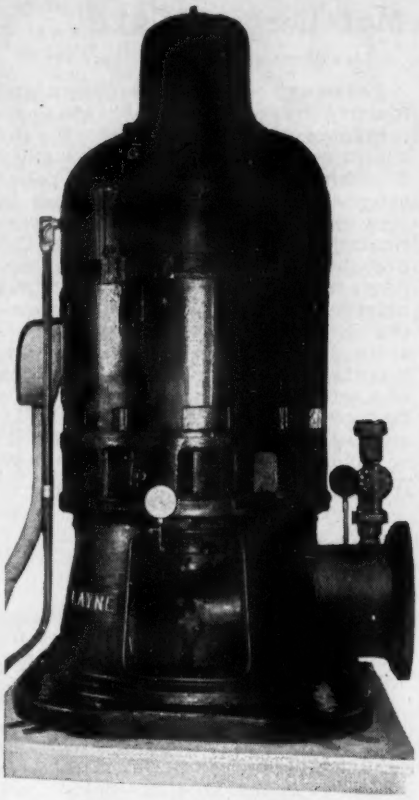
Birmingham—Scrap continues tight and prices are difficult to determine. Largest buyer says it is paying $34.50 to $35 for heavy melting, although some circles insist $37 is the current going price. Transactions as high as $40 and better in scattered instances are reported. Cast grades are especially scarce.

St. Louis — Steel mills here have purchased No. 2 heavy melting steel scrap only at $35.23, delivered, according to a leading broker in this city. This price is based on the Chicago market less the freight differential. It was pointed out that no purchases were made by the mills here during the recent period when prices rose sharply in some districts. Machine shop turnings are reported selling at around $27.

Los Angeles—Scrap prices advanced $3 a ton last week to $25 for heavy melting. Mill spokesmen say need for additional supplies is critical, but so far no mills have curtailed production due to the shortage. Scrap dealers insist that mills here are better supplied than in the East and say that they are shipping to that district. However, mill buyers deny that any but small dealers are shipping since the freight rate to Pittsburgh is $23.61 a ton. Some buyers report paying higher than the official price of $25.

San Francisco—Supply of scrap here continues tight but scarcity is not severe enough to cause disruption to steel mill operations. Industry is actively campaigning to speed breaking up of obsolete vessels as that is considered the chief source of additional scrap and the best method of removing bottlenecks. Price of top grade scrap is holding at $22 but some interests believe an advance is pending. Some quantities of scrap have been moving to eastern mills from the West Coast at premium prices.

Seattle—Increase of $2 per gross ton on steel scrap became effective last week, bringing the market to $24 gross, dealers' yards. Prices at outside points were raised $2, buying levels based on freights to local mills. It is expected that the market will respond to the new price and that receipts will increase. Mills are working cooperatively with dealers and production of shipbreaking plants is increasing. However, supply is about equal to consumption, inventories showing little change.



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Iron Ore . . .

Iron Ore Prices, Page 162

Birmingham — Daily shipment of some four carloads, or approximately 240 tons, of brown ore from the recently organized Cleburne Ore Co., near Heflin, Ala., is reported here.

Cecil White, manager, said the ore is pan mined by use of a gasoline shovel, bulldozer and six yard pans and trucks. Approximately 1 million tons can be mined before the ore runs too deep to be recovered economically. The ore is 47 per cent iron and three per cent manganese.

Officers of the company are Henry A. Perkerson, Anniston, president; Elbert Boozer, secretary and treasurer. T. C. King, who recently opened the new pipe plant at Anniston, also is associated with the company. The mine is owned by N. E. Jones of Oklahoma and is operated by the Anniston men on a royalty basis.

Cleveland—Lake Superior iron ore shipments from United States ports increased during the week ended Oct. 27 to an average daily loading rate of 310,892 tons from 306,626 tons for the previous week, according to the Lake Superior Iron Ore Association. Total shipments during the week ended Oct. 27 amounted to 2,236,178 tons, including 2,176,244 tons from United States ports, compared to a total for the previous week of 2,217,732 tons, including 2,146,380 tons from United States ports. Total shipments during the like 1946 week came to 2,052,640 tons.

The season's cumulative total to Oct. 27 is 70,171,527 tons compared with 51,034,635 tons for the like 1946 period. Shipments from United States ports alone, totaling 68,652,485 tons, showed an increase of 18,745,512 tons over those for the like 1946 period.

Tungsten Ore . . .

New York — High grade wolframite and scheelite have eased to around $30 to $32 per short ton unit, duty paid, on light trading, with consumer inventories having improved, as a result of increased domestic production and a better flow of alloy scrap at the higher prices.

The market as it now stands is in rather fine balance. Imports from China, this country's major source prior to the war, are light, and only relatively small amounts are coming in from South America, as a result of sharper competition from Europe. Imports from Africa and Australia, never heavy at best, remain spotty.

At the same time, if the market were to drop much under $30, duty paid, domestic production would decline, as various mines now operating are high-cost producers. These closed down shortly after the war, with the passing of government subsidies, and remained down until stringency developed earlier in the year and ore prices began climbing.

Manganese Ore . . .

Philadelphia — Manganese ore prices are stronger with 46.50 per cent grade holding at 67 to 69 cents per unit, duty paid, fob cars, East Coast and Gulf ports. Heavy consumption, as reflected by record-breaking peacetime steel production, is a factor.

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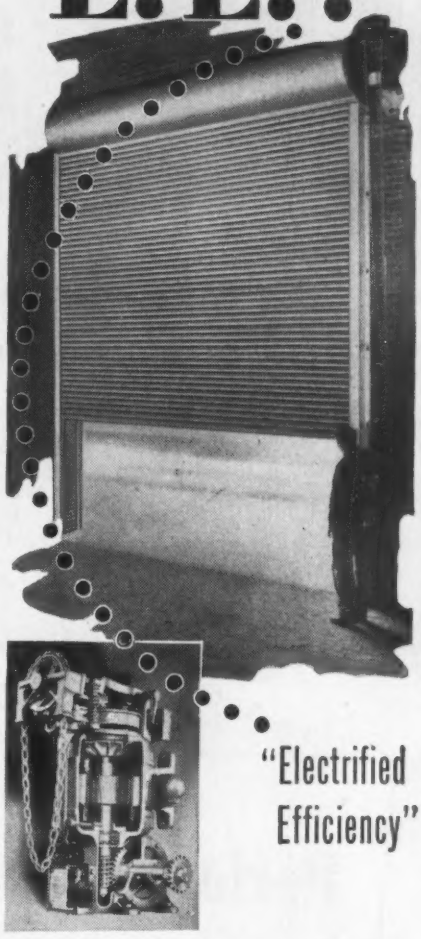

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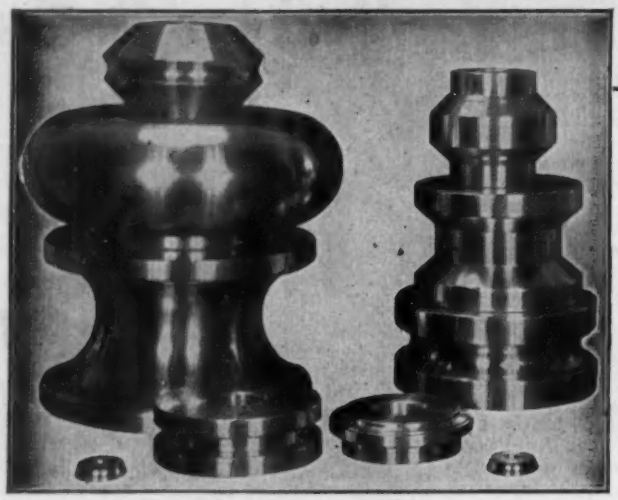

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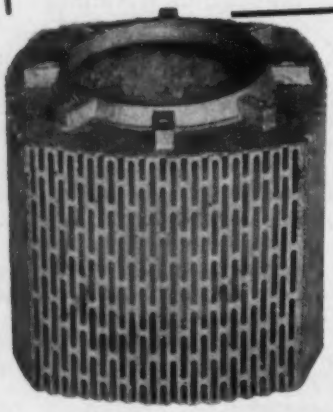

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"Shur-Site" Treads and
Armorgrids

Metallurgical Coke...

Metallurgical Coke Prices, Page 162

Pittsburgh — Steel producers and foundry interests are not too concerned over the supply of coke for the winter months. However, the quality of coke in many instances is below accepted standards and continues to be a retarding production factor, particularly for foundry operations. The probable coal supply this winter appears to be a matter of opinion; some independent operators predict a serious shortage, while a committee covering producer and consumer groups reports there is no present indication of a shortage, although there may be a lack of the better grades in some localities. Lack of coal cars continues to hold down coal mining operations in some fields.

Warehouse...

Warehouse Prices, Page 163

Philadelphia — The month just ended was the best so far this year for most local warehouses. November, which usually shows a decline, is expected to follow this normal pattern, but jobbers expect the decline to be small and if more critical tonnage were available from mills an increase in business could be expected.

Cincinnati — Warehouse deliveries during October held to a level near that of the preceding month, the volume still being limited by inadequate supplies in sheets, plates, shapes and other steel items. Demand appears heavier than ever as stocks continue badly out of balance.

Los Angeles—Sheet, strip, pipe and wire products are scarce in Los Angeles while light gage plates are hard to get but not critical. The market is tight on small merchant bars.

The business curve is on the upstroke at present, with sales virtually level with those of the first quarter following a slump over the summer. Southern California manufacturers have not felt any reaction from the purported lessening of consumer demand for some metal products.

Canada...

Toronto, Ont. — Canadian steel mills are maintaining production to the limit of raw material and labor supply, but to date there has been comparatively little easing in steel supply. While production schedules are somewhat ahead of last year, operations as a whole are only about 75 per cent of rated capacity. Imports from the United States are relieving some of the pressure, approximately one-third of Canadian requirements coming from across the border. Steel plate, structural shapes and sheets account for bulk of imports but special lines also make up a good quota. Recent price advances have had no direct bearing on the market, and steelmakers continue to accept new business with prices to be made known at time of shipment.

On practically all lines of steel Canadian mills now are booked solidly to the end of this year, and while some have withdrawn from the market others are accepting additional orders on an "if, as and when" de-

livery basis. Steel interests in Canada do not look for any slowing down in demand during the first half of 1948, and the majority are of the opinion that shortages will prevail throughout the coming year.

Demand for steel sheets is holding at a high level. There has been no increase in steel sheet quota deliveries in the past month or six weeks, with no indication that there will be improvement in supply this year. Warehouse operators are obtaining regular supplies of sheets, but are having difficulty in meeting requirements of regular customers.

Big orders for steel plate have been poured into the market for last quarter, with most of the buying from railroad rolling stock makers. Plate mills are booked solidly and, despite their increased output, are meeting only about 50 per cent of domestic requirements, with remainder being met by imports from the U. S.

Mills are jammed with orders for fourth quarter on carbon bars, and fresh orders are steadily appearing. However, some mills are out of the market with books filled, but others continue to accept orders with little prospect of shipping until early 1948. On alloy bars, demand has shown some improvement, although there is still surplus capacity to be filled for this quarter.

Big demand is reported for structural shapes and Canadian fabricators are working at capacity. Much of the Canadian supply depends on imports from the States, and recently some large building projects have been held up through slow delivery. At present it is estimated that upwards of 50,000 tons of heavy steel shapes are overhanging the market.

Merchant pig iron sales are being maintained at a high level, with orders for the past week running slightly above the 10,000 ton mark. While there has been some increase in supply of merchant iron recently, the betterment has been almost entirely in basic iron, shipments of which have been running close to 800 tons weekly. Foundry iron continues to head the list, with shipments aggregating about 7000 tons, while malleable iron is moving at a rate of around 2500 tons. Of the 14 blast furnaces in Canada, 12 now are blowing.

Price Control To Be Hard Nut for Congress To Crack

(*Continued from Page 63*)

sion during the following week.

It is expected that powerful influence will be exerted by the House Special Committee on Foreign Economic Aid headed by Rep. Christian A. Herter (Rep., Mass.). Members of this committee have been in practically every nook and corner of Europe and several of them were under guerrilla sniping while on a visit to the Greek front. The Herter committee is reported drafting some very definite recommendations.

Aid Program May Be Pared—Republican leadership will examine cri-

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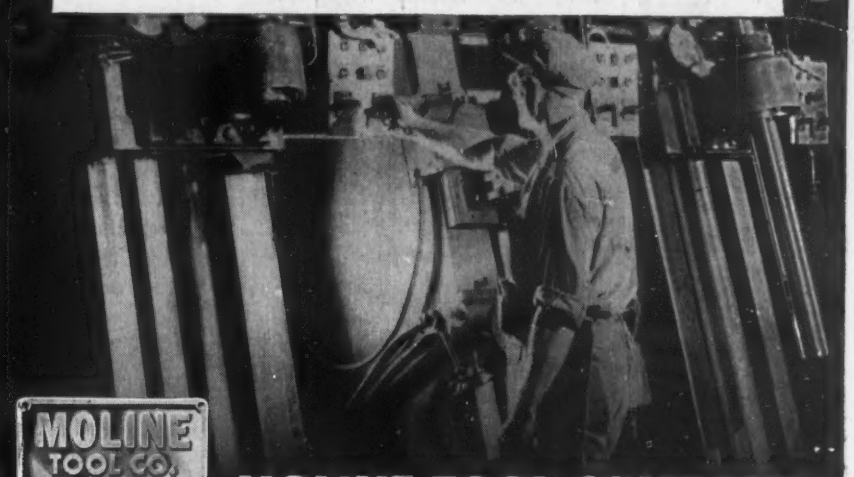

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tically administration proposals for foreign aid. Sen. Robert A. Taft (Rep., O.) last week termed the Marshall Plan in its present form "beyond all reason," and indicated he would carry the fight against it into the special session.

Senator Taft hit at the inflationary results in this country of too great foreign aid. He specifically criticized sending coal to a continent which has vast coal resources and shipping steel when steel is one of the items most scarce in the United States.

Steel Study Projected—In connection with the foreign aid plans, the Commerce Department is considering a study of future steel requirements. The department has been called upon and expects further requests for projections of probable steel requirements over the next few years, and particularly through 1952.

Commerce may ask steel consumers to estimate their future requirements. This would involve a lot of guessing, but it is believed the steel consumers know more about their probable requirements than anyone else. The study, if undertaken, would also involve consultations with steel producers.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

12,700 tons, Tennessee-Arkansas joint commission bridge, Memphis, Tenn., to Harris Structural Steel Co., New York, noted in previous issue as low bidder.

2000 tons, can plant, American Can Co., Hillside, N. J., through Turner Construction Co., New York City, to American Bridge Co., Pittsburgh.

1800 tons, superstructures for bridges, Thermopolis, Wyo., Bureau of Reclamation, Denver, to American Bridge Co., Pittsburgh.

1720 tons, A. & P. warehouse, Mineola, Long Island, through Turner Construction Co., New York to Harris Structural Steel Co., New York.

1240 tons, high school, Troy, N. Y., to American Bridge Co., Pittsburgh.

1225 tons, steel piling, U. S. engineer, Buffalo, N. Y.; 750 tons to Bethlehem Steel Co., Bethlehem, Pa., and 475 tons to Carnegie-Illinois Steel Corp., Pittsburgh.

880 tons, hangars, Sikorsky Aircraft Co., Bridgeport, Conn., to R. C. Mahon, Detroit.

725 tons, school No. 176, Queens, New York, to Harris Structural Steel Co., that city.

700 tons, General Electric Co. building No. 20, Erie, Pa., to Lehigh Structural Steel Co., Allentown, Pa.

630 tons, addition, Christ Hospital, Jersey City, N. J., through James Mitchell, that city, to Bethlehem Steel Co., Bethlehem, Pa.

500 tons, New York road markers, to American Bridge Co., Pittsburgh.

360 tons, Carborundum Co. building, Perth Amboy, N. J., to Bethlehem Steel Co., Bethlehem, Pa.

335 tons, building No. 42, Kenwood Mills, Rensselaer, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

310 tons, manufacturing building, Plainfield, N. J., through Wigton Abbott Corp., general contractor, to Bethlehem Fabricators, Bethlehem, Pa.

260 tons, state bridge Lewis county, Washington, to Poole & McGonigle, Portland; Anderson Bridge Co., Tacoma, general contractor.

200 tons, apartment, 75th St. and West End Ave., New York, to Schacht Steel Construction Inc., that city.

200 tons, plant addition, Universal Folding Box Co., Hoboken, N. J., through James Mitchell, Jersey City, to Elizabeth Iron Works, Elizabeth, N. J.

180 tons, New York state bridge work, to Utica Structural Steel Co., Utica, N. Y.

150 tons, laboratory, International Nickel Co., Bayonne, N. J., to American Bridge Co., Pittsburgh.

100 tons, or more, sluice gates, U. S. engineer, Kansas City, Mo., to Hardie-Tynes Mfg. Co., Birmingham, $530,572.

Unstated, Bureau of Reclamation warehouse, Canyon Ferry damsite, Montana, to Caird Engineering Co., Helena, Mont.

STRUCTURAL STEEL PENDING

5000 tons, Veterans hospital, Newark, N. J., with United States Engineers, 120 Wall St., New York, expected to take bids in about six weeks.

1450 tons, Simon Bros. apartment, Fifth Ave., New York, detailed specifications now being issued for bids.

800 tons, school No. 195, Brooklyn; bids Nov. 6.

750 tons, school No. 3, Brooklyn; bids Nov. 5.

400 tons, candy factory, Mineola, Long Island, pending.

350 tons, building, United States Printing & Lithographing Co., Mineola, Long Island, pending.

290 tons, bridge superstructure, Blue Ridge parkway, Watauga county, N. C.; bids Nov. 18, Public Roads Adm., Arlington, Va.

275 tons, Brownsville Health Center, Brooklyn, N. Y., pending.

275 tons, department store addition, Abramson's, Flushing, Long Island, pending.

195 tons, including reinforcing, state bridge Okanogan county, Washington; bids to Olympia, Oct. 28.

160 tons, including 30 tons reinforcing, 300-foot state bridge, Bitterroot river, Montana; bids in at Butte, Oct. 24.

150 tons, paint warehouse, E. Lucas Co., Gibbsborough, N. J.; bids in.

147 tons, bridge, FAP 020-3-11, Brown county, Wis., for State Highway Department; bids Oct. 21.

142 tons, bridge, FAS 0442-1, Jefferson county, Wis., for State Highway Department; bids Oct. 21.

101 tons, bridge, S-0749-1, Manitowoc, Wis., for State Highway Department; bids Oct. 21.

100 tons, bridge, S-0601-8, Trempealeau county, Wis., for State Highway Department; bids Oct. 21.

100 tons or more, three steel towers, Seattle Skagit project; M. P. Munter, Seattle, low, $16,485.

Unstated, garage and warehouse for Alaska Road Commission, Anchorage, Alaska; general contract to J. B. Warrack, Seattle.

REINFORCING BARS . . .

REINFORCING BARS PENDING

900 tons, Bureau of Supplies and Accounts, Navy department; bids Nov. 4.

848 tons, Narrows bridge, Tacoma, Wash.; Bethlehem Pacific Coast Steel Co., San Francisco, low.

600 tons, Aero building, University of Minnesota, Minneapolis; Hagstrom Construction Co., Minneapolis, low on general contract; bids Oct. 30.

500 tons, automobile warehouse for S. L. Savidge Inc., Seattle; Kuney-Johnson Co., Seattle, low, $449,500.

420 to 705 tons, auxiliary outlet sewers, Beverly-Calumet system, cont. 1-A, Department of Public Works, Chicago; bids Oct. 28.

150 tons, city bridge, Renton, Wash.; Ameri-

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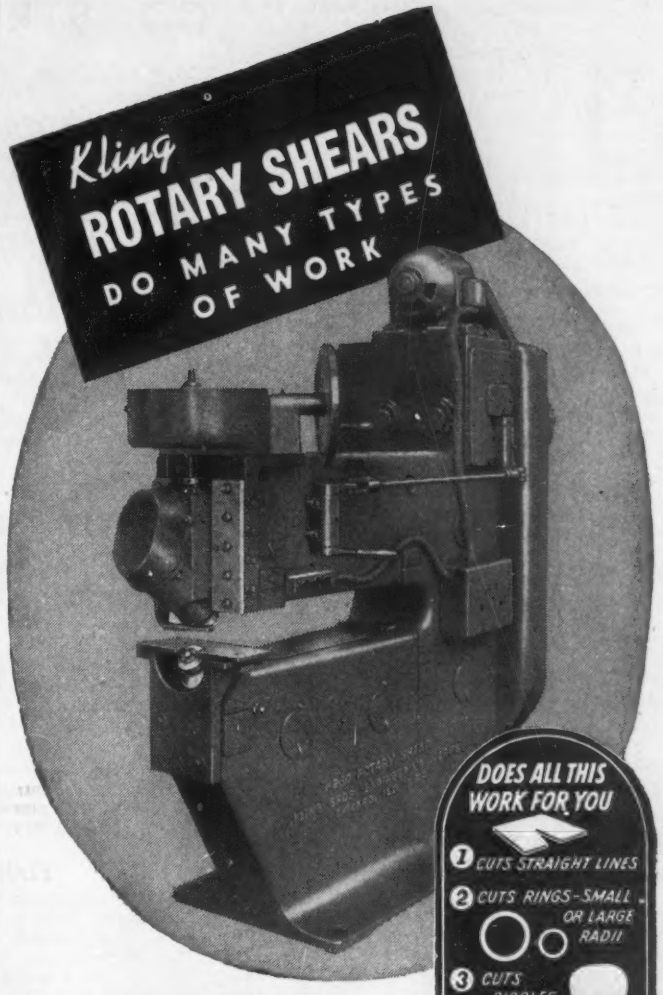

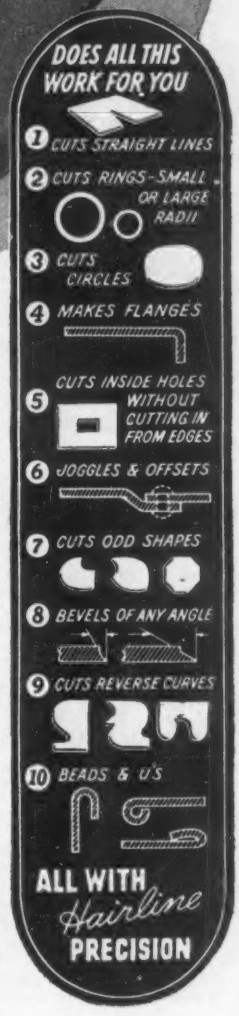
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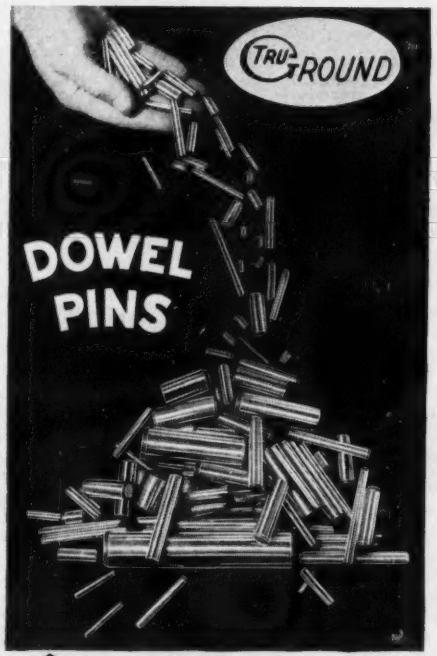

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can Pile Driving Co., Everett, Wash., low $94,000.

150 tons, state hospital Medical Lake, Wash.; bids in.

125 tons, also 25 tons miscellaneous, Deschutes irrigation project, Oregon; bids to Bend, Oreg., Nov. 25.

125 tons, federal aid state highway project, Sutton, Mass.; bids Oct. 28, Boston.

100 tons or more, baseball stadium, Portland, Oreg.; plans in preparation.

100 tons, West Peterboro dam, U. S. engineer, Boston; bids Jan. 23.

Unstated, diversion tunnel, Hungry Horse dam, Montana, reclamation project; Guy F. Atkinson Co., San Francisco, low, $643,400.

Unstated, warehouse for Union Pacific Railroad, Portland; bids in.

Unstated, shop and other structures, Oregon state training school, Woodburn; bids to Salem, Oct. 31.

Unstated, staff dormitory, Buckley state school, Washington; Hall-Atwater Co., Seattle, low, $324,547.

Unstated, 120-foot cantilever concrete bridge, Renton, Wash.; bids to Olympia, Oct. 21.

PLATES . . .

PLATES PLACED

880 tons, tank work, Tide Water Associated Oil Co., Bayonne, N. J., to Bethlehem Steel Co., Bethlehem, Pa.

500 tons, four tanks, Public Service Gas & Electric Co., Sewaren, N. J., to Bethlehem Steel Co., Bethlehem, Pa.

200 tons, tanks, Cities Service Corp., Syracuse, N. Y., to Graver Tank & Mfg. Co. Inc., East Chicago, Ind.

PLATES PENDING

3630, cofferman McNary dam, Columbia river; G. F. Atkinson Co., San Francisco, low $1,096,510, with alternates.

1250 tons, system improvement, Ellensburg, Wash.; bids in.

PIPE . . .

STEEL PIPE PENDING

Unstated, 30,000 feet 4 to 10 inch, and fittings; bids to R. M. Wright, city clerk, Stevenson, Wash., Nov. 5.

CAST IRON PIPE PENDING

270 tons, 8 and 12-inch, Washington, D. C.; bids in.

RAILS, CARS . . .

RAILROAD CARS PLACED

Denver & Rio Grande Western, 15 fifty-ton tank cars, to General American Transportation Corp., Chicago.

Virginian Railway, 1000 coal cars, to own shops, with construction of 500 additional cars of this type contemplated for construction later.

RAILROAD CARS PENDING

Chesapeake & Ohio, 200 automobile cars; bids out soon.

LOCOMOTIVES PLACED

Union Pacific, five 2000-horsepower diesel-electric locomotives, to Fairbanks, Morse & Co., Chicago.

LOCOMOTIVES PENDING

Chesapeake & Ohio, 45 locomotives, including 15 mallet-type mountain locomotives and 30 heavy-duty steam switching engines; bids out soon.

RAILS PLACED

New York Central, 100,000 net tons of steel rail, including varying amounts 105, 127 and 132-pound rail, to Carnegie-Illinois Steel Corp., Pittsburgh, Bethlehem Steel Co., Bethlehem, Pa., Inland Steel Co., Chicago, and Algoma Steel Corp. Ltd., Sault Ste. Marie, Ontario, Canada. The order totals about $5,600,000.

CONSTRUCTION AND ENTERPRISE

ALABAMA

ANNISTON, ALA.—Monsanto Chemical Co., c/o Robert & Co., architect, Bona Allen Bldg., Atlanta, proposes to build a $55,000 plant addition.

BIRMINGHAM—American Rock Wool Co., Wabash, Ind., has awarded a $400,000 contract to Rust Engineering Co. for construction of a new plant, changes in existing buildings and installation of production equipment.

CALIFORNIA

LOS ANGELES—Dura Steel Products Co. has been incorporated by Emil Brown, 300 E. Ninth St., with 2000 shares of no par value capital stock.

SAN FRANCISCO—City and San Francisco county plan to rehabilitate the Market St. Railway at a cost of $20 million. Bond issue is up at Nov. 4 elections.

CONNECTICUT

BETHEL, CONN.—R. T. Vanderbilt Laboratories Inc., 33 Winfield Ave., plans to build a $65,000 manufacturing plant. Engineer is Fletcher Thompson Inc., 211 State St., Bridgeport.

BRIDGEPORT, CONN.—Sikorsky Aircraft Division, United Aircraft Corp., South Ave., has awarded a $75,000 contract to Edwin Moss & Sons, 555 Grant St., for construction of a rotor test and observation plant.

NEW HAVEN, CONN.—Winchester Repeating Arms Co., 275 Winchester Ave., has awarded a $70,000 contract to Hewlett Construction Co., 600 Lindley St., Bridgeport, for erection of a 1-story factory on Division St.

FLORIDA

FLORIDA—Petroleum Pipe & Supply Co. & Associates, 1524 N. Port, Corpus Christi, Tex., has awarded a $210,000 contract to Jess Edwards Inc., Corpus Christi, for taking up over 1 million linear feet of pipeline in the state.

JACKSONVILLE, FLA.—Gibbs Corp., Flagler St., plans a $455,000 expansion program to include warehouses, two manufacturing plants and a general office.

MIAMI, FLA.—Florida Power & Light Co., MacGregor Smith, president, Ingraham Bldg., plans to build an electric generating power plant near here which will cost $350,000 or more.

GEORGIA

SAVANNAH, GA.—Savannah Machine & Foundry Co., W. L. Mingledorff, president, is transferring its plant to a new building opposite Savannah shipyard. New equipment will be installed. Firm is considering construction of a nonferrous foundry and spending $100,000 in improvements to river front piers.

IOWA

ULYSSES, KANS.—Cities Service Gas Co., First National Bank Bldg., Oklahoma City, Okla., has awarded a $750,000 contract to Sherwood Construction Co., Independence, for erection of foundation structures for compressor-engine buildings, machine shop, gas-dehydration tower, auxiliary power generating building, etc.

LOUISIANA

CROWLEY, LA.—Crowley Farm Equipment, W. C. Kelly, president, plans construction of a $75,000 plant.

MINNESOTA

MINNEAPOLIS—Minnesota Linseed Oil Paints Co., 1101 Third St., has awarded a $2 million contract to Fegles Construction Co., 711 Wesley Temple Bldg., for erection of an oil processing plant and a 1 million-bushel elevator on 43rd Ave.

ST. PAUL—International Harvester Co., 2727 University Ave., has awarded a $200,000 contract to Lovering Construction Co., 610 Guardian Bldg., for erection of a 1-story parts depot at Franklin Ave. and Eustis St.

MISSOURI

ORAN, MO.—Missouri Utilities Co., L. A. Byron, president, Cape Girardeau, has awarded a $2 million contract to J. F. Pritchard & Co., 220 Fidelity Bldg., Kansas City, Mo., for the construction of a steam electric power plant, including a 7500 kw generating unit.

ST. LOUIS—Valley Steel Co., 6417 Manchester Ave., has been incorporated by M. H. Maile as a steel warehouse business.

OHIO

CLEVELAND—Winslow Mfg. Co., 2216 E. Ninth St., will erect a $50,000 factory building containing 10,000 sq ft of floor space on E. 23rd St. between Chester and Payne Aves.

CLEVELAND—National Advisory Committee for Aeronautics is spending $10 million for modernization and expansion of its laboratory here. Facility, under direction of Edward Ray Sharp, is being converted to turbo-jet and rocket research.

MANSFIELD, O.—Empire Steel Corp. is spending about $500,000 for the current phase of its expansion and improvement program which includes rehabilitation in its open hearth and bar mills and stamping division. Construction is expected to increase firm's output by 25,000 tons a year.

OKLAHOMA

VELMA, OKLA.—Sunray Oil Corp., Philtower Bldg., Tulsa, plans to build a 70-mile dual crude oil pipeline between here and Allen. Cost will be $1,100,000.

PENNSYLVANIA

BRISTOL, PA.—Seaboard Container Corp., 51st St. and Grays Ave., Philadelphia, has awarded a $750,000 contract to McCloskey & Co., 1620 W. Thompson St., Philadelphia, for construction of a manufacturing plant. Plans are by Silverman & Levy, 1411 Walnut St., Philadelphia.

ELLWOOD CITY, PA.—Glass Products Co., c/o American Window Glass Co., Farmers Bank Bldg., Pittsburgh, has awarded a $75,000 contract to Mathew Lievo & Sons, 320 Lawrence Savings & Trust Bldg., New Castle, for construction of a 1-story factory. Engineer is L. J. Pierce, c/o American Window Glass Co.

GREENVILLE, PA.—Chicago Bridge & Iron Co. has completed plans for a $70,000 addition.

HANOVER, PA.—R. S. Pitts Mfg. Co., High St., plans to build a $75,000 factory. Architect is Milford H. Patterson, 923 N. Second St., Harrisburg.

NEW HOLLAND, PA.—New Holland Machine Co. has awarded a $500,000 contract to Abram S. Horst, R.D. 2, for a plant modernization project.

RHODE ISLAND

PROVIDENCE, R. I.—Gulf Oil Corp., 31 St. James Ave., Boston, has awarded an $83,000 contract to Chicago Bridge & Iron Works, 332 S. Michigan Ave., Chicago, for construction of terminal fuel oil tanks.

TEXAS

BAYTOWN, TEX.—Humble Oil & Refining Co., 581 Humble Bldg., Houston, has cancelled bids submitted for a proposed $205,000 construction project here.

DALLAS, TEX.—Dallas Power & Light Co., Dallas Power & Light Bldg., will build a 1000 kw transformer station on Greenville Ave. at a cost of $144,500.

HOUSTON, TEX.—Southwestern Engraving Co., George Yax, manager, plans construction of a $200,000 office building and manufacturing plant at Montrose Blvd. and Colquitt St. Architect is Harvin C. Moore, 2008 W. Alabama Ave.

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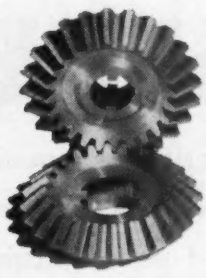

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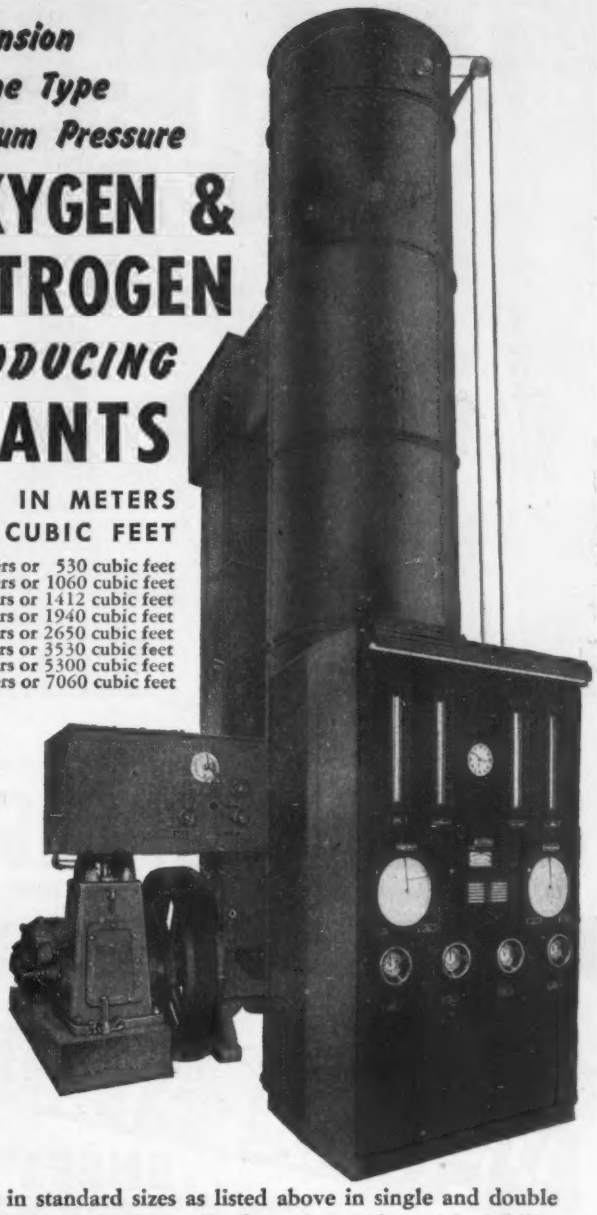

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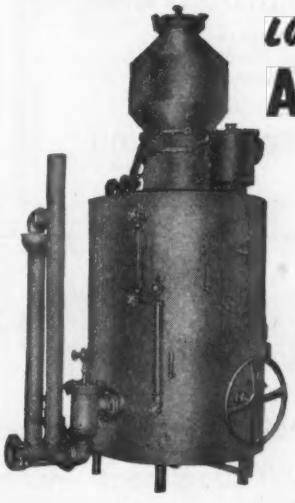

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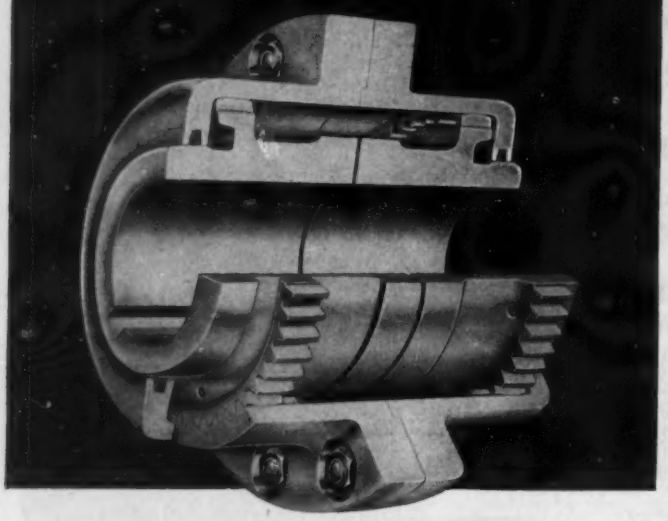

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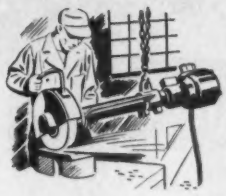

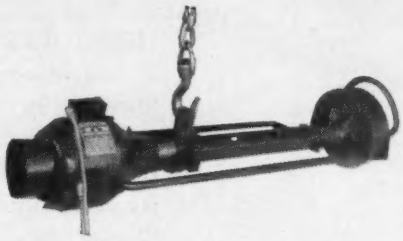

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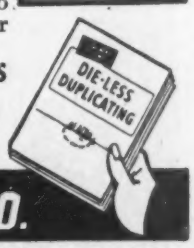

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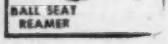

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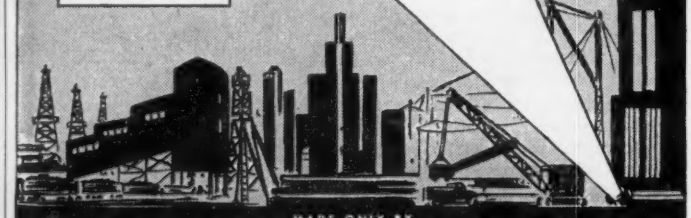

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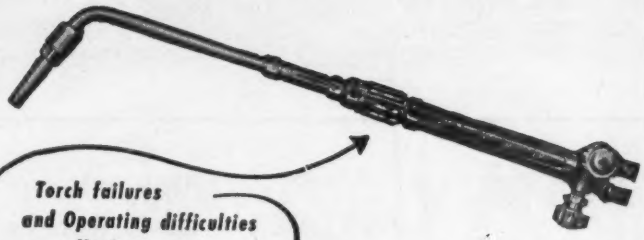

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Most Combination and Welding Torches make up on 'metal to metal' joints, and, naturally, over a period of regular use, this joint fails because of 'galling', the accumulation of dust particles and just ordinary wear, BUT, with a MECO Torch, this mechanical failure is easily overcome... that's because we use patented *armored* Gaskets which facilitate QUICK replacement *right on the job,* thus saving 'down time' for factory repairs.

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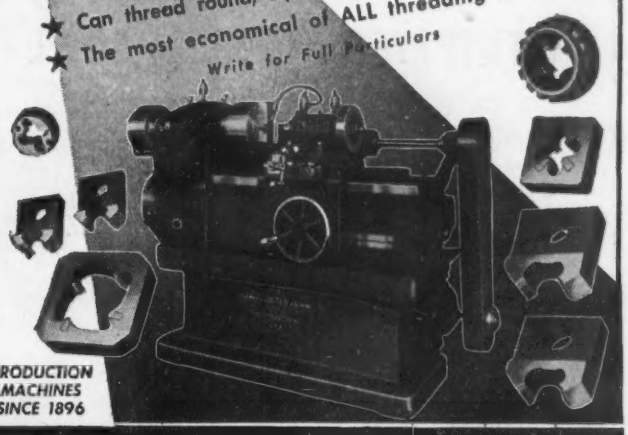

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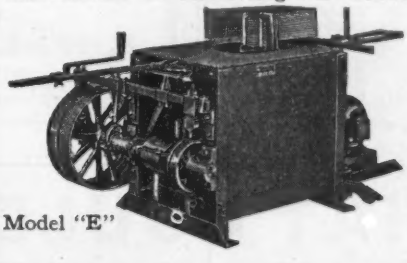

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Louden 19′2″ Span
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Chicago Tramrail 27½′ Span
P&H 37′6″ Span
P&H 42′1½″ Span

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Crane 47′3″ Span
Crane 76′ Span
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Cleveland 51′3″ Span
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Overhead Crane 60′ Span
Whiting 48′6″ Span
Whiting 75′ Span
Shepard Niles 48′6″ Span
P&H 51′4″ Span
P&H 37′ Span

25-TON
Alliance 38′2″ Span
Bedford 67′8″ Span
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Overhead Crane 74′4″ Span
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Morgan 55′ Span
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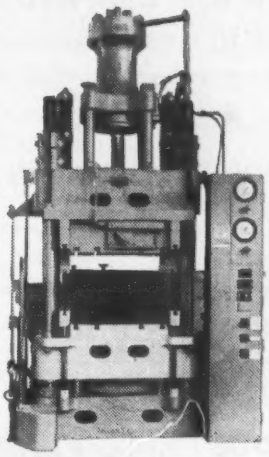

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Suitable for the compression molding of standard as well as very deep parts and also arranged for transfer molding with equally high efficiency. The machine is complete with loading cavity and gate for transfer operation.

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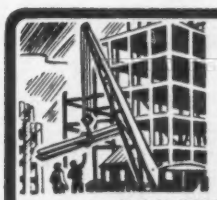

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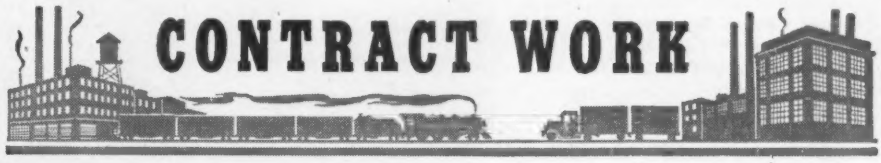

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did you ever see a

MULTIPLE SLITTING & SIDE TRIMMING LINE

With all these innovations?

COIL UNLOADING DEVICE

This coil unloading device permits unloading of one strand or more as desired. Installed at tension reel, the unloader saves many hours of handling time . . . fast, efficient, and compact.

1

TENSION REELS

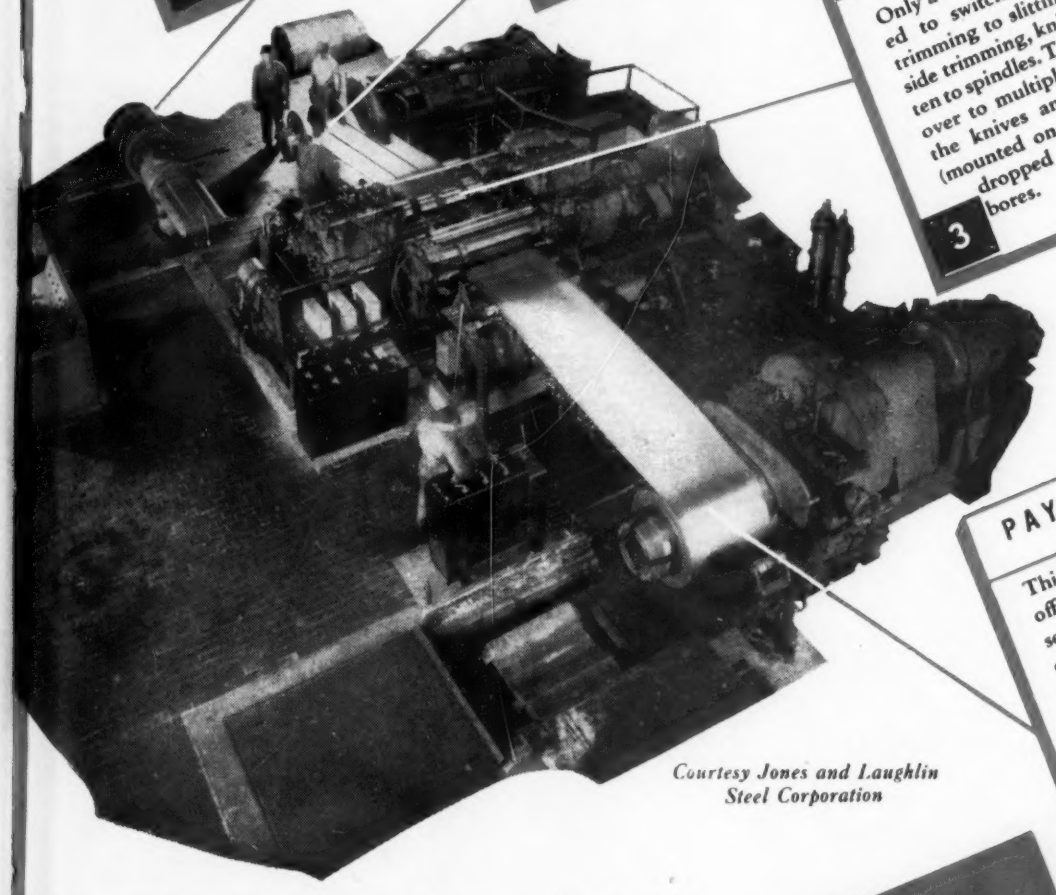
Here's something new in tension reels. Coils of 16" I. D. and 20" I. D. are handled with the Aetna-Standard tension reel on this line.

2

QUICK SWITCH-OVER

Only a few minutes needed to switch from side trimming to slitting. For side trimming, knives fasten to spindles. To change over to multiple slitting, the knives and spacers, (mounted on arbors) are dropped into tapered bores.

3



Courtesy Jones and Laughlin Steel Corporation

PAY-OFF REEL

This mandrel-type pay-off reel, with removable segments, handles 3 sizes of coils . . . 20" - 24" - 30" dia. Here again, many hours production time can be gained in change-over operations.

4

Sizes—Side Trimming and Multiple Slitting cold reduced coils up to 48" max. in gauges .017 to .109. *Max. Wt.*—22,000 lbs. *Speeds*—250 to 1,000 ft. per min. *Advantages*—(a) fast handling; (b) easy threading and operating; (c) quick unloading; (d) more production time—less man hour waste.

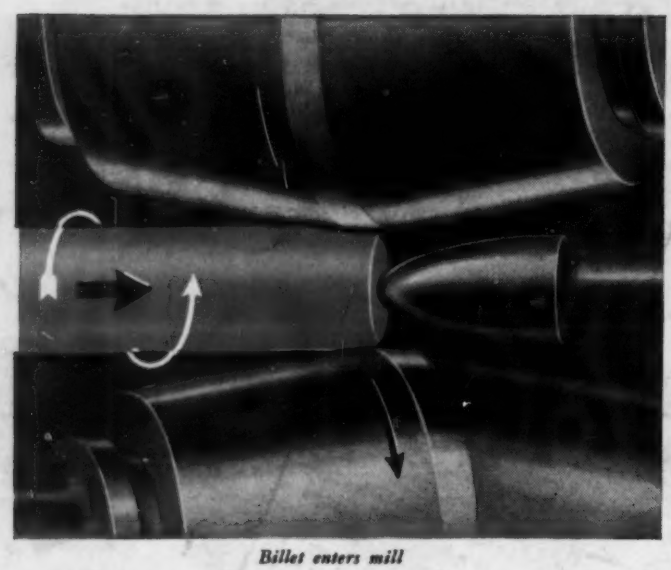
In addition to the four major innovations, this line has many other unique features. And Aetna-Standard sales engineers, upon request, will be glad to discuss your requirements.

THE AETNA-STANDARD ENGINEERING CO.
YOUNGSTOWN, OHIO

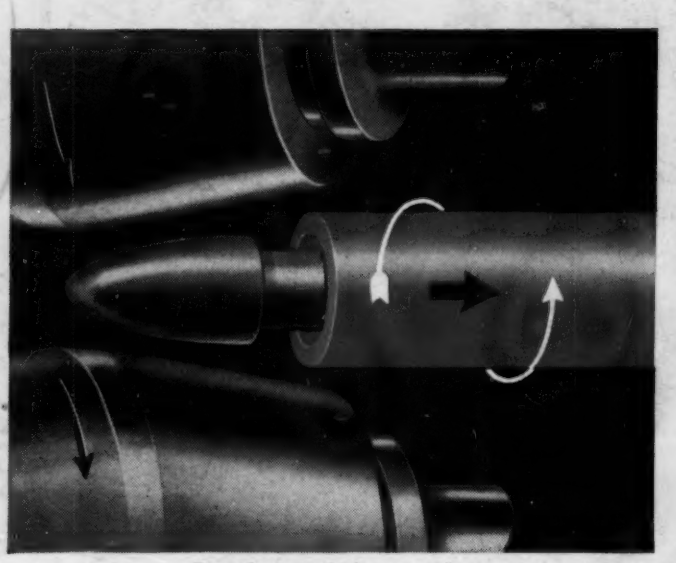
ASSOCIATED COMPANY:
HEAD, WRIGHTSON & CO., LTD., THORNABY-ON-TEES, ENGLAND

No temperature drop during piercing

. . . another reason for the superior forged quality of Timken tubing



Billet enters mill



Pierced at rate of a foot a second

IF you make a hollow cylindrical part, chances are you can make it stronger, or cheaper—or both—with Timken seamless tubing.

During the piercing, which is basically a forging operation, Timken tubing is worked inside *and* outside. And because this forging action takes place at the rate of a foot a second there is no temperature drop while the metal is being worked. Result: uniform forged quality all through the finished tube.

The metal displacement during the piercing of Timken tubing results in a denser structure, finer grain size and improved transverse grain flow. This means increased strength and ductility for any part made from Timken seamless tubing.

Uniformity from tube to tube and heat to heat is also assured because the Timken Company closely controls quality from melt shop through final inspection. And because Timken tubing can be inspected on the inside surface as well as the outside, your scrap losses are reduced.

Many manufacturers of hollow cylindrical parts have increased strength and decreased cost with Timken seamless tubing. During the war, for instance, heavy duty gun barrels made from Timken tubing proved superior in strength yet cost far less than those made by conventional methods. Why not see if Timken seamless tubing can help increase the quality and decrease the cost of your product. Call on our Technical Staff for an on-the-job analysis. No obligation. Write Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio.

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing.